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VETERINARY MEDICINE

SEPTEMBER 1946

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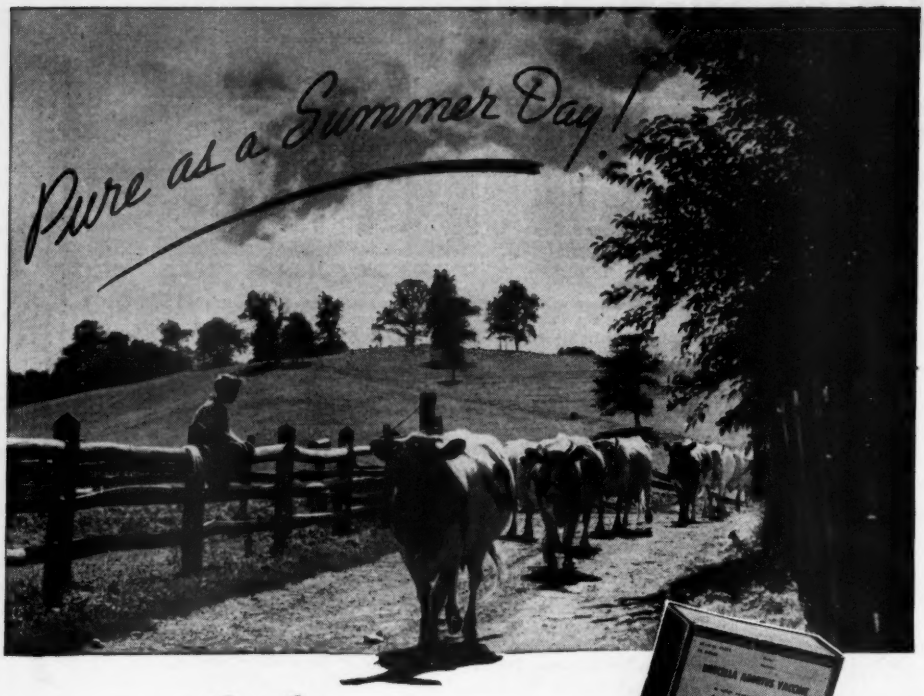

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D. M. CAMPBELL, *Editor*
7632 S. Crandon Ave., Chicago 49, Ill.
Telephone South Shore 7160

H. J. MOSTYN, *Eastern Representative*
P. O. Box 121, Sussex, New Jersey
Telephone Sussex 2F18

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It is well established that ringworm of cats, dogs, horses and cattle all are infectious for man.

In India during the surra season, a single dose of one gram of naganol (germanin) as a prophylactic is said to protect horses and mules from the disease.

Metropryl is a new anesthetic related to ether developed by J. C. Krantz of the University of Maryland. It is less irritating but more potent than ether, gives greater muscular relaxation, the anesthesia lasts longer and the disagreeable after effects are less than for ether anesthesia. Chemically the new anesthetic is n-propyl methyl ether.

Jan. 1, 1946, there were 73,293 herds containing 579,444 cows enrolled in artificial insemination associations. The growth of such associations during 1945 was rapid; the increase in the number of herds being 31,273 and in cows 237,465. Wisconsin ranks first among the states in the number of cows enrolled. The number of bull associations decreased by 30% during 1945 owing to absorption by artificial insemination associations.

Poultry P.M. Inspectors Wanted

There are a number of openings for veterinarians in the federal poultry inspection service at this time. The starting pay of these positions is $3397.20. Prospects for the promotion to positions paying $4172.40 are regarded as excellent.

The synthesis of penicillin has proceeded to penicilloic acid which differs from penicillin only in having an additional molecule of water. Success in removing this molecule is predicted by organic chemists.

Urea peroxide dissolved in anhydrous glycerol gives a new type of antiseptic solution called thenardol which owes its antiseptic effect to hydrogen peroxide. It is a much more stable solution than ordinary hydrogen peroxide, and its action on wounds or infected skin is not so transient as that of the long known hydrogen peroxide.

Up to the turn of the century, the principal preoccupation of veterinary literature was "The Germ Theory of Disease." At the time of World War I, unnamed accessory factors of nutrition, "vitamins" ushered in a new era on the evaluation of foods. In the 1930s, "The Nature of Viruses" stand apart from all other important studies. The 1940s will be of record in medical history as the rebirth of chemotherapy.

Three officers of the Medical Corps of the Navy investigated an outbreak of encephalitis on Okinawa in the late summer of 1945. The disease was determined to be due to the Japanese B encephalitis virus. As a part of the investigation the sera of nine horses was tested and all found to fix complement of the virus, thus indicating all had contact with the disease. "The nature of this contact is not known, but the results described support the idea that horses may have been of epidemiologic importance in the outbreak."

Colonel Rife Awarded Legion of Merit

For especially meritorious work during the war at the San Francisco port of embarkation, Col. George J. Rife, V.C., Port Veterinarian at Ft. Mason, California, was awarded the Legion of Merit in April, 1946.

It is reported that Colonel Rife will retire from the Army at an early date and make his home on a farm that he owns near Liberty, Missouri.

* * * *

Colonel McCallam Receives Legion of Merit

Col. James A. McCallam, V.C., Chief of the Veterinary Division in the Surgeon General's Office was presented the Legion of Merit Award, April 18, 1946, by Major General Norman T. Kirk, the Surgeon General. The citation accompanying the award reads as follows:

Colonel James A. McCallam, 09466, Veterinary Corps, United States Army. For exceptionally meritorious conduct in the performance of outstanding services in the Southwest Pacific Area and Japan, from 16 April, 1944 to 2 December, 1945. As the senior veterinary officer of the Medical Section, Sixth Army, Colonel McCallam displayed outstanding leadership and sound judgment in solving various complex problems incident to the maintenance of high standards of health and morale and in insuring the uninterrupted medical logistical support of the Sixth Army. In addition to his normal responsibilities, Colonel McCallam undertook numerous inspection trips over widely scattered areas of New Guinea and adjacent islands which greatly aided in improving sanitary conditions and rendered most capable assistance in planning new operations and making essential training inspections. He did much to elevate the standards of hygiene and sanitation, lessening the vulnerability of troops to a host of tropical diseases. Arriving in Leyte, Philippine Islands, although manifestly suffering from the effects of a recent severe respiratory disease, he unhesitatingly accepted the new responsibilities of Executive Officer of the Medical Section and most efficiently mastered the multitudinous details of his office. Compelled to operate with his office divided into two widely separated echelons, he effectively integrated the activities of all sections and maintained maximum efficiency of operations. Devoting long hours and painstaking application throughout the Leyte and Luzon campaigns, Colonel McCallam proved of inestimable value in insuring the constant supply of combat forces and in conserving the lives of the wounded. In Japan his ingenuity and organizing ability were of great value in maintaining an army undergoing many readjustments which included impending inactivation. Through his superior professional skill, resourcefulness, and unfaltering devotion to duty, Colonel McCallam made a conspicuous contribution to the success attained by the Sixth Army.

Colonel McCallam received the Bronze Star Medal in the S.W. Pacific in December, 1945, before returning to Washington.

Veterinary Corps Officers Separated from the Service Since VE-Day

(Supplement to lists previously published)

Alabama
Conner, Robert Francis

California
Christopher, B. C. — Gould, Clinton L.
Dean, Ben H. — Hand, Pearl Hugh
Goldsmith, Bernard — Lovik, Stanley A.
Sawyer, Howard E.

Colorado
Clark, Sterling D.

Connecticut
Elting, Stewart E.

Delaware
Greene, Lester M.

Georgia
Akins, Everett Horton — Lennon, Thomas W.

Illinois
Emerson, Harry H. — Hasselbalch, Neal I.
Tacke, Frederick J.

Iowa
Field, Dale Wirt — Mannasmith, C. H.
Pennings, Arthur W.

Kansas
Twiehaus, Marvin John

Maine
MacKenzie, William P.

Massachusetts
Hall, Jonathan P.

Michigan
Brecheisen, Adell W. — Grover, Donald F.
Failing, Charles H. — Kuzewski, Henry J.

Minnesota
Fisher, Vurl Eldon — Johanson, Lawrence V.
Larson, Emil V. — Pollman, G. A.

Missouri
Jerstad, Arthur C.

Nebraska
Gollehon, Charles W.

New Jersey
Coyle, Emanuel F. — Gaydosh, Louis W.
DeCinque, Peter — Steinbach, Karl F.
Sylstra, Anthony W.

New York
Babich, Peter Joseph — McClelland, Frank E.
Gentile, Frank L. — McKim, Orville E.
Jenkins, DuBois L. — Payton, Jerome
Kennelly, Edward M. — Saylor, Samuel L.
Love, W. Graham — Walker, Joseph W.
Watkins, Robert R.

North Carolina
Randall, Charles B.

Ohio
Daughtrey, Franklin D. — Foley, Randall J. J.
Engard, Richard M. — Gardner, Richard S.
Ross, Walter Eugene

Pennsylvania
Apt, Samuel — Kroll, Harry M.
Barnes, Carl G. — Martin, John Edgar
Richter, Jacob B.

South Carolina
Ginn, William — Sweringen, Chas. R.

Tennessee
Eldred, Arthur Chas.

Texas
Allen, James W. — Lee, Robert E.
Rehkemper, Jack A.

Virginia
Pearl, Martin David Wiatt, Alexander T.

Washington
Dungan, William M. Kirk, Arthur D.
Zook, Roy Firman

West Virginia
Scothorn, Marion W.

Wisconsin
Candlin, Paul Kerns, Robert L.
Erickson, Carl Fred. Marsh, Herbert L.
Meeusen, Clarence W.

Canal Zone
Juni, Robert P.

Porto Rico
Clavell, Cesar

Suggested Explanation of the Ozier Award

A reader has a new guess as to how it happened that Major Ozier, a civilian veterinary officer, received an Army Commendation Ribbon, on a day when only 10 military awards to the veterinary service were announced, thus leaving but nine awards for officers of the Veterinary Corps of the Regular Army.

The explanation offered, and it can be only a guess, is that Major Ozier has applied for a commission in the Veterinary Corps of the Regular Army and has been tentatively accepted. Thus when he is taken into the marsupial pouch and becomes a brother in the lodge he, too, will have a decoration.

One reader has pointed out that if only the reference to this peculiar case of Major Ozier's in the July issue is read, it might be inferred that veterinary officers had received only 10 military awards. Of course such is not the case. While the total number is not known, it is large for the size of the Veterinary Corps. Reference to the case of Major Ozier occurs in the June issue, page 186; July issue, page 224, and the August issue, page 262. When all references are read the meaning is clear.

Antirabies Vaccine in Poliomyelitis

According to a correspondent of the Journal of the American Medical Association, Dr. Luis Mario Beramendi, Montevideo, Uruguay, reports success in the treatment of 34 cases of poliomyelitis with antirabies vaccine. There were no deaths among those treated with the vaccine. All patients that received the vaccine during the first month of the attack recovered without sequels. In the other patients noticeable improvement was observed following use of the vaccine although in six cases the vaccine was not employed until six months after the outset of the disease. Doctor Beramendi pointed out marked similarities between the viruses of rabies and poliomyelitis.

Artificial insemination associations have 11,000 members among Ohio dairymen. In 1945 37,000 cows were inseminated artifically.

A Jewish University

A complete change in management of Middlesex University which will be of material advantage to the veterinary school of the university has taken place recently.

As a result of this change the medical school has been discontinued and all its equipment and facilities, including classrooms and laboratories, have been made available to the veterinary school.

The veterinary school and the preveterinary school will be continued as at present. A department of Arts and Sciences is planned for 1947 and a medical school later.

The new president of the University is Dr. Israel Goldstein, Rabbi of Congregation B'nai Jeshurun, New York City, president of the Jewish Conciliation Board of America, president of the Albert Einstein Foundation for Higher Learning and a member of other Jewish national and international organizations.

A fund-raising campaign for endowments is under way and is said to be making excellent progress.

Schenley Institutes Research Fellowship Program

Schenley Distillers Corporation, and Schenley Laboratories, Inc., through their affiliate, The Schenley Research Institute, announce the establishment at the University of Wisconsin, of post-doctorate research fellowships, totaling $110,000 for the study of factors affecting the production of antibiotics and their action on human, animal and plant diseases.

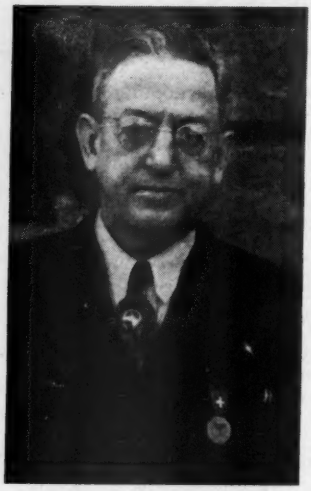
The fellowships have been established for a three-year period, and will be assigned by the University to the departments of Agriculture, Bacteriology, Biochemistry, Plant Pathology, Veterinary Science and Botany, at Madison, Wisconsin.

The Fellows will be appointed by the University on the basis of proved ability in their fields and will receive salaries of $3,600 to $4,000 a year. The fellowships are granted without condition and will be applied for the conduct of basic scientific research, the results of which will be published in whatever manner seems, in the judgment of the University, to serve the public interest best.

Schenley, through its subsidiary, Schenley Laboratories, Inc., is one of the leading producers of penicillin and a pioneer in the field, and also is active in development of other pharmaceuticals.

Dean Marstellar Retires

Because of poor health which has afflicted him for several years, Dr. Ross Perry Marstellar, Dean of the School of Veterinary Medicine, Texas A & M College has requested to be relieved of all administrative duties at the earliest convenience of the College. Probably at the beginning of the fall semester his request will be granted and he will become Dean Emeritus and Professor of Veterinary Medicine



DR. R. P. MARSTELLAR
Photo taken at the XIII International Veterinary Congress, Zurich, Switzerland, 1938

in recognition of his long service (41 years) to the institution.

Dean Marstellar joined the Texas institution immediately upon graduation from OSU in 1905, and the School of Veterinary Medicine upon its inauguration in 1916. He became dean upon the death of Dr. Mark Francis in 1937 but owing to the partial incapacity of the latter the principal administrative responsibility had rested upon him for a dozen years at the time he became dean officially.

In retirement Dean Marstellar expects to indulge more freely his lifelong hobby of horsemanship and the breeding of fine horses.

* * * *

In a carefully controlled experiment at the University of Minnesota, Holstein-Friesian cows were fed grain mixtures containing 16, 20 and 24% protein with timothy and clover hay of medium quality. On the basis of a year's production the 16% protein mixture proved as efficient as the higher protein feeds. There was no indication that the greater amount of protein had any stimulating effect on milk or milkfat production.

Allergy in a Horse

A case of skin allergy in a horse was reported at a meeting of the American College of Allergists—by two veterinarians—Lester Reddin, Pearl River, N. Y., and Donald W. Stever, Hollidaysburg, Pa. The animal was affected with a dermatitis of the head, neck and saddle region. Various tests determined the irritant to be a combination of wool yellow dye in the saddle soap and sulfonated neatsfoot oil in the leather conditioner used. Neither agent alone was irritating.

* * * *

Veterinary Positions in Korea

The Civil Affairs Division of the War Department is desirous of obtaining two veterinarians for duty in the Civil Affairs Administration in Korea.

The positions are: Assistant Chief Bureau of Veterinary Affairs and Director, Institute of Veterinary Research. The duties, salaries and qualifications desired are as follows:

1. *Assistant Chief Bureau of Veterinary Affairs, Korea.*

(a) Salary: $7381.50.

(b) Duties: To assist in supervising the Veterinary Bureau, hiring, discharge and promotion of U. S. and Korean personnel, consolidate and approve requisitions, secure and supervise distribution and proper use of supplies, supervise the verification of suspected communicable diseases, institution of necessary control measures, and preventive and diagnostic injection programs, supervise the inspection of slaughter houses, dairies, and all meat and dairy products processing plants, supervise preparation and printing of forms, receive, consolidate, and evaluate all reports from the field, review and revise laws and ordinances relating to veterinary affairs, review and budget accounts for national bureau and lower echelons, secure grants for schools, advise all veterinary schools, prepare radio and news releases, conduct short courses, coordinate with other bureaus for efficient operation of veterinary services. Qualifications: male, licensed veterinarian, with two to three years' experience in B.A.I., U.S.D.A., or as State Veterinarian, or equivalent. Should have experience with field work in communicable disease control and in veterinary sanitary inspection. Should have administrative ability and be able to demonstrate approved methods.

2. *Director, Institute of Veterinary Research, Korea.*

(a) Salary: $6127.50.

(b) Duties: Administration of laboratories located at Pusan and Taegu Kitasato Institute producing biological products for Korea, supervising technical processes in laboratory work on veterinary products and research on the production of vaccine.

Applications, giving academic training, qualifications and experience, should be addressed to:

Chief of the Veterinary Division,
Office of the Surgeon General,
War Department, Washington 25, D. C.

Significant Statements

By CAPTAIN WM. H. LINDLEY*

"Age of a breeding female cannot be authentically computed so well by the recorded date of her birth, or by her incisor teeth, as by her physical health and the health of her uterus as revealed by her afterbirth," from W. L. Williams, Diseases of the Genital Organs of Domestic Animals, 3rd ed., p. 122.

"The dairyman may employ eminent sterility experts, illustrious geneticists, noted food chemists; he may quarantine; he may disinfect his cow externally and internally; he may feed vitamins, hormones and essential minerals to, or beyond the limits of his purse; he may use abortion vaccines, bacterins and nostrums without number; but the heifer which has suffered important arrests in the development of her genital organs during the first year of her life cannot become a successful breeder." W. L. Williams—Diseases of the Genital Organs of Domestic Animals, 3rd ed., p. 102.

Udall, The Practice of Veterinary Medicine, 4th ed., page 32, in discussing the etiology of heaves in horses says: "The malady does not develop in pastured horses. . . ."

The following is not a quotation from but a summary of chapter X of F. C. Russell's Minerals in Pastures, Rowett Institute, 1944.

Equine infectious anemia, though caused by a filterable virus, is far more prevalent in horses receiving a vitamin B deficient diet, as is apt to be the case in horses fed forage grown on soils having a high manganese content. This is due to the fact that manganese oxidizes vitamin B rapidly. Virulence of the virus is apparently enhanced or the resistance of the host is reduced by deficiency of Vitamin B. Manganese absorption by the plants is reduced by liming the soil. Yeast is an excellent source of Vitamin B.

The following excerpts from an article titled, Trichostrongylosis of Sheep and Goats, by R. D. Turk (*N. A. Vet.*, August, 1945) may be worth repeating: "Phenothiazine-salt (1-10) mixture aids in preventing a worm parasite load from building up, but it will not remove the parasites from a heavily infected lamb. Nor will it prevent lambs from picking up infection from a heavily contaminated pasture." It is almost impossible to stop losses in lambs from trichostrongyles, when they are continuously exposed to reinfection."

Dean Hagan, The Infectious Diseases of Domestic Animals, 1944, page 570, under the heading "Canine Infections with the Virus of Fox Encephalitis," says "Green and co-workers showed as early as 1927 that dogs can be infected readily with the virus of fox encephalitis. The experimental diseases in dogs was described in some detail by Green and Shillinger in 1934 and by Beckman and Torrey in 1940. These findings have raised the question of how often canine infections occur naturally. The symptoms of fox encephalitis in dogs are similar to those of canine distemper and can readily be confused with them. Dogs which have been immunized against the canine distemper virus and are insusceptible to additional injections are susceptible to the fox virus, thus proving that there is no relationship between the two viruses."

"When a single animal in a herd suffers without apparent cause from gastroenteritis that terminates fatally in one to three days, one should search for poisoning."—Udall, The Practice of Veterinary Medicine, 4th ed., p. 155. On the same subject, page 671, he says: "There is a tendency to attribute the cause of every unknown disease to some form of poisoning. For this reason it is important for a veterinarian to be familiar with the most probable toxic agent in his locality."

"Epinephrine (adrenalin 1:1000 solution) in doses of 3 to 8cc, administered subcutaneously, is a specific for serum accidents, and it should be available for immediate use whenever bacterins or serums are used." Udall, The Practice of Veterinary Medicine, p. 670.

"As the economic and national importance of veterinary science depends principally on the service rendered to the community, by securing and maintaining the health of farm animals, attention to the needs of smaller pet animals must occupy a subsidiary, though not unimportant position. But it is well to bear in mind that the the preservation of the health of pet animals is essential to the safety of the community that houses them; further the good health of these animals may be a useful factor in maintaining the morale and happiness of the populace." — Diagnostic Methods in Veterinary Medicine, by Geo. F. Boddie, 1944.

*Station Hospital, Hendricks Field, Sebring, Florida.

Toxicity of Alpha Naphthyl Thiourea for Chickens and Pigs

By WAYNE A. ANDERSON
Pathological Division, Bureau of Animal Industry, U. S. Department of Agriculture, Washington, D. C.
and CURT P. RICHTER
Johns Hopkins Hospital, Baltimore, Maryland

EXPERIMENTS are now being carried on to determine the toxicity of the new rodenticide, alpha naphthyl thiourea (ANTU), for common farm animals such as chickens, pigs, calves, sheep, and horses. The observations on young chickens and pigs have progressed far enough to establish the fact that ANTU can poison pigs and young chicks but is apparently less toxic for older birds.

A series of observations were made on groups of young chicks from three to five weeks of age. Different age groups were fed a 2% or a 3% mixture of ANTU in mash. The chicks ate the mash freely. Half the birds were dead within 18 hours. Of the survivors, most of those supplied with plain mash recovered. Those continued on ANTU and mash ate very little and most of them died within four days. Other groups were given a choice of plain mash and the 2% ANTU mixture. These ate some of the ANTU-poisoned mash but much more of the unpoisoned mash. Only a few of these chicks died. Although large amounts of ANTU are needed to kill baby chicks, they ingest a lethal dose owing to their very high food intake.

After feeding on poisoned mash, the chicks soon became depressed, listless, and sought the warmth of the hover, assuming a squatting position. On post-mortem examination, the lungs showed little gross evidence of edema but the pericardium was frequently distended with fluid. In some cases, the livers showed light areas and the kidneys appeared swollen.

A group of pullets, averaging 1½ pounds, was given varied doses of ANTU up to the quantity to be found in six ounces of 2% poisoned mash. Only one of this group died but the survivors lost considerable weight and would have been unprofitable birds.

Histological examination of the lungs of five chicks and one pullet which had died from poisoning revealed a slight pulmonary edema. These birds also showed well-marked fatty changes of the hepatic and renal parenchyma.

Pigs freely ate mash mixed with 2% ANTU. When given a choice of poisoned and unpoisoned mash they showed no preference for the latter, as did chicks. Doses as small as 37.5mg per kilogram of body weight killed some of the pigs. This means that a large handful (105gm) of 2% mixture of ANTU with mash might suffice to kill a 125-pound pig. Mash containing 2% ANTU, fed at the rate of 25mg per kilogram of body weight to a 136-pound pig, was not fatal and failed to produce symptoms of serious distress.

Pigs dead from ANTU poisoning showed marked cyanosis of the skin particularly in the region of the throat and around the base of the ears. At necropsy, an extreme pulmonary edema with an excess of fluid in both the air spaces and interlobular connective tissue was noted. In addition, 1600cc of free fluid was aspirated from the pleural cavity of a 135-pound pig dead from ANTU poisoning. The mucous membranes of the trachea and bronchi were engorged with blood and the lumen partially filled with foamy fluid. Death resulted from asphyxia. A catarrhal gastritis was also observed, apparently caused by the irritant action of the drug.

On histological examination of the hogs poisoned with ANTU, the outstanding alteration was pronounced pulmonary edema characterized by stasis of the interlobular lymph vessels and the presence of edema fluid in the interlobular connective tissue and the pulmonary alveoli. In two of the pigs which had been fed large doses, there was beginning de-

After feeding on poisoned mash the chickens became depressed and listless and sought warmth of the hover assuming a squatting position

generation of the parenchyma in the central portion of the hepatic lobules.

A group of adult Norway rats was fed a 2% ANTU bait in the afternoon of June 3 and all succumbed during the night. Average consumption of ANTU per rat was 32mg. The following day, each of two pigs, which had been fasted for three days, was offered one of the dead rats. Both pigs refused to eat the rats during a period of one hour. Pig No. 10, weight 152 pounds, was then given the viscera of four rats, chopped up and mixed with mash, which it ate reluctantly. Pig No. 11, weight 182 pounds, was likewise fed the viscera of six rats. The pig consumed all of this meal in about an hour. Observations were made during the day of feeding and for the two succeeding days. No symptoms whatever of poisoning were noted.

Because extremely small amounts of ANTU are fatal to rats, it is probable that pigs will not eat enough rats to become poisoned. If all the ANTU consumed by the rats were retained in the visceral organs, pig No. 10 would have received only 128mg and pig No. 11 only 192mg of the poison. These amounts are far below the fatal dose since, in experimental feedings, it required at least 37.5mg per kilogram of body weight to kill. In other words, the fatal dose for pig No. 10 would have been $37.5 \times 69.1 = 2593.25$mg.

It is unlikely that, under ordinary poisoning operations for rats on farms, either young chicks or pigs would be exposed to lethal amounts of ANTU. More likely, however, is the possibility that large amounts of poisoned grain, either before or after a poisoning operation, will be left or stored in places which are accessible to farm animals or that the grain may be fed by mistake. Every precaution should be observed to sweep up all poisoned grain on the ground and floors after a poisoning operation and to keep any unused poisoned grain in places which are completely inaccessible to farm animals. It follows that, in towns and cities where garbage is collected and used as hog feed, ANTU-poisoned grains and baits should not be disposed of in garbage pails.

A further note of caution should be sounded at this time in regard to the possible toxicity of ANTU to human beings. Monkeys tolerate very large quantities, several hundred times as much per kilogram of body weight as is tolerated by Norway rats, thus indicating that it may be non-toxic to man. Although ANTU has actually been handled directly by many thousand workers for several years without harm, nevertheless it should be treated as a human poison until definite information to the contrary has become available.

Record Poultry Income

A record high level of $2,764,974,000 poultry income was reached in 1945. This was a 12% increase over that of 1944. Eggs furnished about 62% of the gross income.

Island Livestock Quarantine Station

An animal Quarantine station will be established on Swan Island, 150 miles off the coast of Honduras in the Caribbean Sea. As soon as the necessary installations can be provided it is designed to facilitate importation of disease-free livestock into the United States for breeding purposes and to protect this country's livestock industry from animal diseases of foreign origin. The station will be operated by the Bureau of Animal Industry, U. S. Department of Agriculture but its facilities will be available to other countries.

This new quarantine station will provide a safe means for the importation of strains of livestock in demand in this country for breeding purposes—such as Zebu cattle and Caracul sheep. Operation of the station will not, in itself, remove any existing Department of Agriculture animal quarantine requirements. However, it will make it easier for imported livestock to conform to present quarantine regulations and will safeguard United States livestock herds from contracting diseases from imported animals.

Research Society Organized

The National Society for Medical Research, a clearing house for information on medical studies and discoveries, has been organized under the sponsorship of the Association of American Medical Colleges with the cooperation of 101 national scientific organizations.

Dr. Anton J. Carlson, President of the National Society for Medical Research and Professor Emeritus of Physiology at the University of Chicago, has announced the establishment of the Society's headquarters office at 25 East Washington St., Chicago, Illinois.

The Society has as its purpose the advancement of research in medicine, biology, pharmacy, dentistry and veterinary medicine. Doctor Carlson emphasized that an important function of the Society is to analyze and expose the propaganda of small but highly vocal groups which object to the use of animals in the experiments without which medical science would still be in its infancy.

Every year doctors and researchers must take time from their vital duties to defeat legislation proposed by these groups which would hamper or stop the work of the medical profession.

Swine Brucellosis Control Program

THE following procedures of sanitation, vaccination and control are results of the experiments run on swine brucellosis at the University of Idaho Experiment Station, by G. C. Holm, D.V.M., W. B. Ardrey, Ph.D., and W. M. Beeson, Ph.D.

Testing Procedure

The original tests should indicate the sows and boars that are reactors to brucellosis. After learning the condition of the herd and separating all reactor sows and boars from the clean, i.e., non-infected, pigs, a reasonable testing program can be followed. All sows and boars should be tested prior to the breeding season. Those sows that react should be bred under a different set of conditions than the clean sows. That procedure will be given later.

All clean sows and boars after breeding should be kept on clean ground. All bred sows should be retested just prior to farrowing so that proper disposal can be made of the reactor and clean sows at the time they are put on range. These sows should again be tested at weaning time. Any sows that reacted at farrowing or weaning time and did not react at breeding time should have their pigs tested at weaning time or soon after. Whenever possible all pigs in an infected herd should be tested at weaning time as a precaution against spread of disease at the time young gilts start coming in heat.

Disposal of Reactor Sows and Boars

Not all reactor sows can be economically slaughtered. Experience at the University indicates that it is not necessary to slaughter these reactor sows since they return to a negative, non-carrier stage in about six to eight months. It has further been shown that sows that have reached their peak titer before breeding, if settled, will carry their pigs full term without transmitting the infection to them. These young pigs will also be negative until weaning time. On the other hand, sows that are developing the disease either at breeding time or following breeding may abort or farrow normal-appearing pigs which are infected at birth. It is because of this condition that it is necessary to run blood tests at breeding, farrowing and weaning time. All sows and gilts that show clinical symptoms such as lameness and spondylitis should be disposed of even though they are foundation breeding stock. Boars that are reactors to swine brucellosis may be kept in isolation and given sexual rest until negative. A period of 8 to 12 months is usually needed before they return to negative provided they do not show clinical symptoms such as lameness and orchitis. Boars that have shown an orchitis should not be kept under any consideration because the majority of them will be sterile.

Breeding Schedule

Young negative gilts can most safely be bred to young negative boars. However, older boars that are known to be clean can be used on these animals. All negative animals should be bred first if the same boar is to be used on reacting sows. Probably the best and cheapest procedure for breeding reactor sows is to use a boar that can be disposed of immediately after the breeding season.

Vaccination Program

Work done at the University has indicated that some degree of protection can be given to susceptible pigs by vaccinating with a fresh *Brucella abortus,* strain 19 vaccine. Work on control exposures where an extremely virulent organism was used showed that vaccinated gilts farrowed out normal pigs at 88.8% with

Third generation progeny from a formerly reacting sow but which has long since returned to negative status

11.2% abortions, while non-vaccinated gilts exposed in the same way only farrowed 22% normal with a 78% abortion and positive cultured pigs. It was felt that this experiment was much more severe than a natural exposure, but even so, a test and sanitation program should be used to give satisfactory results. Two different experiments using a natural exposure as a testing method have been conducted. In neither of these instances have vaccinated pigs aborted or had abnormal farrowings. The proper age for vaccination appears to be between 110 and 130 days. Pigs vaccinated between 54 and 69 days of age

Doctor Holm is shown vaccinating a pig of right age. Doctor Ardrey is taking down the ear notch numbers of pigs vaccinated

gave an average peak titer of 1 to 25 at 21 days. Pigs between 70 and 99 days of age gave an average titer of 1 to 80, and pigs 100 days and up gave a titer of 1 to 125.

All pigs vaccinated should be tested at the time of vaccination or before. The full dose of Brucella vaccine should be injected either back of the ear or in the armpit. These pigs should again be tested in exactly 21 days so that peak titers can be determined. All gilts so far tested have returned to negative before they reached the age for breeding for gilt litters.

Older sows may be vaccinated for protection if they are going into an infected herd. They should be kept in isolation for at least 21 days, however, to give their immunity a chance to develop. Older boar replacements may be treated in a similar manner. It must be understood that swine vaccinated during adulthood will require a longer time to return to negative blood titers. No tests have been conducted on effect of vaccination on pregnant sows, but there is some chance for abortions.

Under no condition should animals that are reactors be vaccinated because it would merely cover the blood picture of a natural infective titer.

Protection of Animal Experimentation

Antivivisection bills are pending in Congress and in the legislatures of New York, Massachusetts, Maryland and other states. Another bill has just been introduced in the New York state legislature at Albany. This second bill puts scientific experiments on dogs under the authority of the state health department. The health department may license medical students and medical and biologic investigators to conduct such experiments on payment of an annual license fee of $1,000 and posting of a bond of $5,000. How, if such experiments are cruel and futile, will licensing by the state health department make them any less cruel and futile? And what about the state of New York charging medical students and medical and biologic investigators an annual license fee of $1,000 for doing their best to advance medicine and biology? To me it does not make sense.—*Anton J. Carlson in J. Am. Med. Assn.*, May 4, 1946.

Effective Treatment

Penicillin ointment is the most effective treatment known for chronic blepharitis and conjunctivitis according to Capt. S. H. Stein, M.C. It gives rapid relief from the symptoms and overcomes the infection which was due to staphylococci in a series of 25 cases treated by him.

Antivivisectionists Obstruct March of Science

So far the antivivisectionists have won no campaigns, but they have won local skirmishes. In cities like San Francisco, Cleveland, Boston and New York they have secured ordinances prohibiting medical schools from using animals sentenced to death in city pounds. As a result, 33,000 animals are killed in Boston each year and rendered into soap and fertilizer, while medical schools waste money sending out of the state for animals necessary in teaching and research.—*Norman Kirk*, Surgeon General, U.S.A., quoted from *Hygeia*.

Lead Arsenate Relieves Scouring in Lambs Due to Tapeworm Infestation

By R. T. HABERMANN*
Washington, D. C.
and F. N. CARLSON**
Brookings, South Dakota

DURING the summer of 1945, the writers had an opportunity to investigate the etiology of lamb scours in western South Dakota, in connection with which some experiments on the taeniacidal action of lead arsenate were incidentally carried on. Attention was drawn to the presence of tapeworms while making post-mortem examinations of a few scouring animals. Lead arsenate was selected for trial because reports[1,2,3,4,5] had indicated that it might be an effective and useful taeniacide for the common sheep tapeworm, *Moniezia expansa*.

Materials and Methods

The experimental findings reported herein were obtained while investigating the possible rôle of gastrointestinal parasites in the causation of lamb scours in the vicinity of Newell, South Dakota. Much of the investigation, according to prior plans, dealt with the relationship of nematodes to scouring, since there was some experience and a wholly rational basis for ascribing importance to this class of parasites. The present report, however, deals chiefly with the relationship of tapeworms to the scouring syndrome and with the use of lead arsenate for the removal of these parasites, although the importance of nematodes in lamb scours should not be overlooked.

The tests were conducted from August to October, 1945, at the U. S. Belle Fourche Field Station, located at Newell, South Dakota. The work was undertaken in cooperation with the South Dakota Agricultural Experiment Station and the Extension Service of South Dakota State College, the South Dakota Livestock Sanitary Board, and the Western South Dakota Sheep Growers Association. The lambs involved in the work discussed in this paper were Rambouillet range animals born during the months of May and June.

The technic employed to determine the efficacy of lead arsenate for the removal of the tapeworm, *Moniezia expansa*, consisted of (1) treatment of the lambs with one gram of lead arsenate in a No. 13 gelatin capsule and (2) placing manure bags, referred to throughout this paper as pants, on the lambs for the collection of feces and worms passed during a 24-hour period subsequent to treatment. The pants were put on the lambs daily until no tapeworms or segments were found in the screened feces; usually four or five days were required for the elimination of tapeworms following treatment. The lambs were not fasted prior to treatment. Subsequent to treatment, some of the lambs were returned to the range and others were kept in a small pasture at the station. After a period of observation, some of the treated lambs were killed and the entire gastrointestinal tract was examined carefully for worms remaining. The usual screening technic was used in collecting the stomach worms, but because of the small size of the intestinal worms only one-tenth of the total quantity of ingesta and scrapings of the small intestines was examined under a dissecting microscope to determine the approximate number of Trichostrongylus, Nematodirus and Strongyloides present. At the necropsy each lamb was examined grossly for evidence of pathological changes that might have been caused by the drug.

Because the lambs were placed on a contaminated pasture for about a month after treatment, the efficacy of lead arsenate was calculated from the number of tapeworms removed by treatment and the number of tapeworms over 12 inches in length recovered at necropsy, it being estimated that shorter worms were almost certainly the result of infections acquired subsequent to treatment. Curtice[6] estimated the average growth of *Moniezia expansa* to be nearly one yard per month.

Daily or tri-weekly visits to the range were made to observe the animals and to record all pertinent data. Unhealthy animals were picked up at this time and brought to the station for treatment or necropsy. To observe further, the injury produced by the tapeworms and to test more accurately the taeniacidal efficacy of lead arsenate, 14 nonscouring lambs, graded from poor to good, were brought to the station for treatment and necropsy.

Observation and Data

The pertinent data on three scouring lambs and the necropsy findings are recorded in Table I. It will be noted that a large number of tapeworms (126 plus) were recovered from these lambs at the necropsy; also there was

*Zoological Division, B.A.I., Agricultural Research Administration, U. S. Department of Agriculture.
**South Dakota State College, Brookings, S. D.

no evidence of anemia in the lambs and they harbored only small numbers of roundworms.

Since, in these lambs, no inciting factors, other than tapeworms, were found that could have been responsible for the scouring and loss of weight, 15 additional infested lambs were each given one gram of lead arsenate in clinical trials. The results are shown in Table II. It will be noted that 35 scolices and 2½ pints of strobilae were removed from three of these scouring lambs, Nos. 974, R1 and 976, and that the condition of each lamb improved following the medication. Moreover, no tapeworm eggs were found in fecal samples after treatment. One nonscouring lamb (No. 994) was given one gram of lead arsenate September 14, and September 17 tapeworm eggs were found in a fecal specimen. These eggs may have been from a destroyed tapeworm or from a normal tapeworm. However, this animal is classed as one in which the drug was not effective in removing all the cestodes harbored. The removal of tapeworms from 11 scouring lambs, Nos. R2 to R12, was also beneficial. These lambs had normal feces, seemed strong and healthy four days after medication and, although they were run through the chutes with the rest of the band, prior to being trucked to market, there were no cutbacks.

The pertinent data and necropsy findings on 19 critically tested lambs are presented in Table III. The administration of one gram of lead arsenate to each of five scouring lambs, Nos. 712, 778, R13, R14 and R15, was immediately beneficial as all the animals showed marked improvement in health subsequent to the medication. In the tests on the remaining 14 non-scouring lambs, tapeworms were present in six. Four of these six were completely freed of their tapeworms. One tapeworm was found in one of the remaining lambs and 11, over 12 inches in length, were found in the other infested lamb at necropsy. One lamb (No. 840) that was not scouring prior to treatment had soft feces five days after treatment. It was given a second dose and no untoward reactions, due to the two treatments, were observed subsequent to medication or at necropsy. The first treatment removed several tapeworms, but the results of the second treatment were not specifically determined inasmuch as this was given in the field, but

TABLE I. HELMINTH EGGS PER GRAM OF FECES AND WORMS RECOVERED FROM THREE SCOURING LAMBS AT NECROPSY.

Lamb No.	Date (1945)	Wt. (lbs.)	Helminth eggs per gram of feces				Helminths recovered at necropsy					Remarks
			H.	T.	N.	M.	H.	T.	N.	Moniezia Scolices	Moniezia segments (pints)	
1	Aug. 19	30	2	1	0	0	8	12 1/	0	2/ ?	1	June lamb, color of conjunctiva and skin normal; scouring for 7 days.
984	Aug. 20	51	1060	720	20	+ 3/	695	10	300	37	1	May lamb; color of conjunctiva and skin normal; weak; scouring for about 4 days.
736	Aug. 27	67	0	0	0	+ 3/	1	0	4	89	1	May lamb; color of conjunctiva and skin normal; weak; scouring for 2 days; humped up and with a stiff gait.

H.—Haemonchus
T.—Trichostrongylus
N.—Nematodirus
M—Moniezia
1/ The numbers of nematodes in the small intestines were estimated by the sampling technique mentioned elsewhere in this paper.
2/ Number of tapeworms present not determined.
3/ No egg counts made.

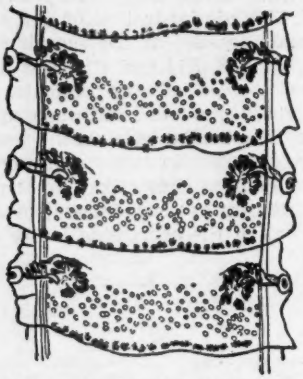
TABLE II. NUMBERS OF MONIEZIA EXPANSA REMOVED FROM 15 LAMBS FOLLOWING ADMINISTRATION OF ONE GRAM DOSES OF LEAD ARSENATE, AND THE NUMBER OF HELMINTH EGGS PER GRAM OF FECES FOLLOWING TREATMENT.

Lamb (No.)	Treatment data: Date (1945)	Weight (lbs.)	Moniezia removed: Scolices	Moniezia removed: segments (pints)	Post-treatment data: Date (1945)	Wt. (lbs.)	Helminth eggs 1/: Nematodes	Helminth eggs 1/: Cestodes	Efficacy of drug (percent)	Remarks
974	Sept. 4	66	10	1	Sept. 17	69	10 H.	0	100	May lamb; had been scouring for about 3 days; feces formed; health much improved.
R1	Sept. 6	57	0	2/ 1	Sept. 14	63	.....	..	100	May lamb; had been scouring for about 7 days, and was weak; feces formed; health much improved.
976	Sept. 12	61	25	½	Sept. 17	57	10 N.	0	100	May lamb; had been scouring for about 3 days; feces formed; health much improved.
994	Sept. 14	47	2	½	Sept. 17	47	20 H. 30 N.	+	0	May lamb; not scouring, but not gaining even though its mother had plenty of milk; health improved.
R2-R12 3/	Sept. 14	35–60	+	+	Sept. 17	..	.....	..	...	Lambs brought from range to hospital corral because of scouring and inability to keep up with band. One lamb died in the corral prior to treatment. Numerous tapeworm segments found in feces of treated lambs; health much improved by treatment; lambs shipped to market Sept. 18, 1945.

1/ Eggs estimated per gram of feces.
2/ Segments obtained subsequent to treatment disintegrated and decomposed.
3/ Individual fecal examination made on one gram of feces, and from these 11 samples a total of 10 Haemonchus and 20 Trichostrongylus eggs were counted; Moniezia eggs were present in the feces of 6 lambs.

there was no further evidence of soft feces.

Macroscopic examination of the internal organs of each of the lambs at necropsy showed no evidence of injury from the drug.



Moniezia expansa (enlarged).* Mature proglottis of each segment has two sets of genital organs; the testes are distributed throughout the central field and the two uteri are reticular

None of the fringed tapeworms, *Thysanosoma actinioides*, which were present in six of the lambs, were removed by the lead arsenate treatment.

In passing, it will be noted that the administration of one gram of lead arsenate to eight scouring lambs, Nos. 974, 976, 712, 778, R1, R13, R14 and R15, removed a total of 72 tapeworm heads and a large quantity of segments from these animals. A total of 37 tapeworms were recovered from lambs Nos. 712, R14 and R15 at necropsy. Since these animals had been on a contaminated pasture for about a month after treatment, and since most of the recovered tapeworms at necropsy were less than 12 inches in length, it seems reasonable to assume, in view of the reason previously stated, that these small worms were acquired subsequent to treatment. Using this standard, only seven of the 79 tapeworms presumed to have been present before treatment, in the scouring lambs, survived the medication. On this basis, the estimated efficacy of the single treatment was approximately 91.8 percent. Each of the 19 scouring lambs treated in this experiment showed notable improvement following medication. The feces from the lambs became drier and were in pellets within one to four days after the removal of the tapeworms, several of the animals passing pellets immediately after elimination of the tapeworms (Fig. 1). The appetites of the treated animals increased and their general appearance and conformation were markedly improved within a week after treatment.

Discussion

In the foregoing experiment, the dose of one gram of lead arsenate per lamb, used arbitrarily in preliminary trials, indicated that the drug, in this dosage, is not injurious. No other dosage was tried. It is possible that smaller quantities of the drug might be effective in removing Moniezia from lambs.

During the 1945 pasture season, considerably fewer nematodes were found in lambs in western South Dakota than in the antecedent four or five years. Unfavorable climatic conditions and improvement in the methods of sheep husbandry are believed to have been responsible for this reduction in the numbers

Fig. 1. Feces from scouring Lamb No. 974, 24 hours after treatment with one gram of lead arsenate, showing mass with tapeworms, and normal pellets formed immediately after expulsion of tapeworms. Photograph by Mr. A. Osenbrug, Belle Fourche Field Station, Newell, South Dakota, Sept. 6, 1945

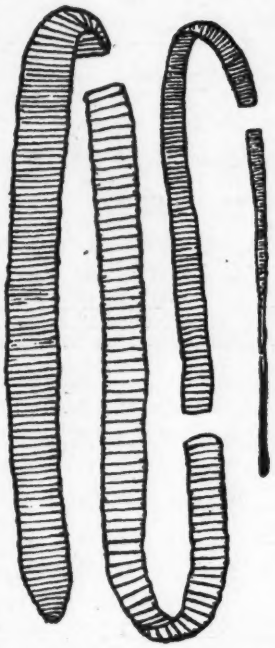
*Illustration from *Parasitology* by Hegner, Root, Augustine and Huff. Courtesy D. Appleton-Century Company, Inc.

of nematodes. Although tapeworms are the only parasites incriminated in this report as being responsible for the scouring syndrome, it is believed that other parasites, especially Haemonchus, may be predisposing or contributory causes of this disease.

The lamb-scouring syndrome observed during the 1945 pasture season was the same as that shown by the sick lambs in previous years, except that the condition was not as widespread as in the past, and occurred about three weeks later in the season.

Two outbreaks of scours occurred in the vicinity of Newell during the latter part of August and it was reported that 10 to 15% of the lambs in each flock were affected. The precautions taken by the sheep raiser involved in the first outbreak, to protect his lambs from scouring, ordinarily should have been adequate had the trouble been due to nematodes. In addition to administering anthelmintics to each of his ewes during the winter months and employing a system of pasture rotation at weekly intervals during the summer months, the lambs were given therapeutic doses of phenothiazine July 25. About two weeks later the lambs began to scour, and by the last week in August, the rancher had 175 scouring lambs in a hospital corral. At this time, each of the scouring lambs was given one ounce of "CuNic" drench. The rancher reported that bucketfuls of tapeworms were passed and that the health of the lambs improved following the medication. In the second outbreak, it was reported that the sheep raiser had suffered a $1,000 loss due to scours in his flock. Therapeutic doses of phenothiazine had been given to these lambs during the last week of July. The treatment of 11 of these scouring lambs and their recovery following the administration of one gram of lead arsenate has already been discussed.

All the scouring lambs responded quickly to the lead arsenate treatment, and when returned to the range, their health continued to improve; there was no recurrence of dysentery. The scouring lambs were all lightly infested with nematodes, and no inciting cause, other than tapeworms, was found that could have been responsible for the scouring syndrome. Because of these findings it appears legitimate to assume that tapeworms were the chief etiological factor of scouring in the cases described. This conclusion supports the contention of Curtice[6] and others who have considered that tapeworms might be responsible for scours in range lambs.



M. Expansa (after Railliet). Natural size portions of the adult. Ripe segments found in the feces are whitish to yellowish in color and they resemble cooked rice grains

Courtesy, B. A. I.

Rambouillet Ewes, United States Sheep Experiment Station, Dubois, Idaho

TABLE III. NUMBERS OF MONIEZIA EXPANSA REMOVED FROM 19 LAMBS AFTER ADMINISTRATION OF ONE GRAM DOSES OF LEAD ARSENATE, AND NUMBER OF OTHER HELMINTHS RECOVERED AT NECROPSY.

Lamb No.	Treatment data: Date (1945)	Wt. lbs.	Moniezia removed: Scolices	Moniezia removed: segments	Necropsy data: Date (1945)	Wt. lbs.	H.	1/ T.	1/ N.	1/ Others	Moniezia recovered under 12′	Moniezia recovered over 12′	Thysanosoma	Efficacy of treatment percent	Remarks
712	Sept. 4	53	8	½ pint	Oct. 3	55	3	0	760	2/ 440 S. 3/ 40 I.	8	2	0	80	May lamb; scouring for 4 days; losing weight; health much improved by treatment; feces becoming normal.
778	Aug. 30	57	28	1 pint	Oct. 3	66	5	20	720	0	2	0	0	100	May lamb; scouring about 2 weeks; losing weight; much improved by treatment; feces becoming normal.
840	Sept. 12 Sept. 17	56	3	½ pint	Oct. 5	60	2	60	100	20 S. 4/ 2-T.	0	0	1	100	May lamb; not scouring but losing weight even though its mother had plenty of milk; soft feces, so retreated Sept. 17; feces normal after second treatment.
R13	Sept. 13	30	0	numerous	Sept. 15	30	10	...	0	.....	0	0	0	100	June lamb; began scouring Aug. 1; treated with CuNic on August 7, and still scouring on September 13.
R14	Sept. 13	30	0	do	Oct. 5	53	0	520	420	140 S.	4	0	0	100	June lamb; history same as R13; four broad tapeworms under 2″ in length found in large intestines; health much improved and feces in pellets after treatment.
714	Sept. 27	89	0	0	Oct. 6	87	1	60	20	0	0	0	0	...	May lamb; not scouring.
884	Oct. 1	64	0	few	Oct. 8	64	40	0	260	0	0	0	0	100	do
902	Oct. 1	74	0	few	Oct. 8	74	38	0	100	20 I.	0	0	0	100	do.
R15	Sept. 6	39	1	½ pint	Oct. 9	53	1	60	1280	60 S.	18	5	0	16	May lamb; very weak and scouring; health markedly improved and feces in pellets after treatment.
894	Oct. 4	52	0	0	Oct. 10	52	21	600	1240	140 I.	0	0	0	.....	May lamb; not scouring.
826	Oct. 8	49	0	0	Oct. 11	49	1	180	2620	1 T. 200 I.	0	0	1	.....	do.
882	Oct. 9	52	0	0	Oct. 12	52	1	20	20	1 T. 240 I.	0	1	0	0	do.
858	Oct. 9	61	0	0	Oct. 12	61	28	0	720	20 S. 180 I.	0	0	3	.....	do.
834	Oct. 10	70	0	few	Oct. 13	70	2	20	220	40 S. 80 I.	0	0	0	100	do.
752	Oct. 10	40	0	0	Oct. 13	40	11	240	1760	40 S. 60 I.	0	0	0	.....	do.
798	Oct. 10	52	0	0	Oct. 15	52	5	80	2720	5/ 2 O. 300 I.	0	0	0	.....	do.
934	Oct. 8	62	0	0	Oct. 11	62	142	360	1340	2 O. 5/ 1 T. 100 S.	0	0	4	.....	do.
852	Oct. 4	50	0	0	Oct. 10	50	15	220	80	1 T. 340 I.	0	0	1	.....	do.
886	Sept. 27	82	0	0	Oct. 21	83	52	80	2660	180 I.	10	11	5	0	May lamb; not scouring; 15 broad tapeworms under 6″ in length found in large intestines.

1/ Numbers of worms estimated by sampling technique.
2/ Strongyloides.
3/ Immature worms.
4/ Trichuris.
5/ Ostertagia.

Summary and Conclusions

1. In trials with lead arsenate on 26 tapeworm-infested lambs, doses of one gram of the drug removed, safely and effectively, a high percentage of the tapeworms *(Moniezia expansa)*.

2. When administered to scouring lambs, the treatment proved remarkably effective in curing the condition.

3. Evidence is advanced to indicate that tapeworms are an important cause of scouring in lambs in the area where the work was done.

4. Lead arsenate, at the dose rate of one gram per lamb, was not effective for the removal of the fringed tapeworm, *Thysanosoma actinioides*.

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The Incidence of Setariasis in Colombia

By JOSE GONZALEZ ALVAREZ,
Cali, Colombia

The author examining blood smears for microfilaria

SETARIA, nematode inhabitants of the peritoneal cavities of horses and cattle, have been known for many years—150 years in solipeds and more than 100 years in cattle. Both Neumann and Steel, in 1888 recounted cases in which Setaria occurred in enormous numbers in the peritoneal cavities of horses which suffered from extreme debility and emaciation and ultimately succumbed. They regarded the condition and the deaths as due to the parasites, but state that the conclusion was not proved.

Later parasitologists have either questioned the pathogenicity of Setaria or refuted it. Underhill[1] (1924) referring to this parasite in the horse wrote, "Unless present in exceptionally large numbers, these worms do not produce serious disturbances." Monnig[2] (1934) says of it, "It may produce a slight fibrinous peritonitis, but is usually of no consequence." Cameron[3] (1934) says: "In the body cavity they do little or no damage." Chandler[4] (1944) writes, "They do no appreciable damage." The foregoing refer to the effect of *Setaria equina* in the peritoneal cavity of solipeds. All agreed that this parasite is harmful on those rare occasions when it invades the eye. None of the parasitologists mentioned, regard the *Setaria labiato-papillosa* as being pathogenic in the peritoneal cavity of the ox.

A study of this parasite in horses, asses and cattle in Colombia has convinced the writer that it is responsible for considerable stunting and loss of condition in both solipeds and cattle and, not infrequently, causes death in the young and sometimes in adult animals and it is of considerable economic importance in Colombia. The view, that Setaria are not without pathogenic significance, agrees with opinions expressed by Neumann[5] (1888) and Steel[6] (1888).

During the summer vacation (December, 1941, to February, 1942) between his junior and senior years at the Facultad de Medicina Veterinaria de la Universidad Nacional, Bogota, the writer began a survey of the incidence of setariasis in western Colombia. With some interruptions it was continued till a few months ago, when I began practice in Cali.

The initial investigations were made at Monteria in the Department* of Bolivar at an elevation of 20 meters above sea level, on the river side of Sinu. During these months I made many trips in company with Dr. Vincente Escobar Méndez, then Assistant Station Veterinarian. I was very fortunate in seeing many cases of setariasis and other diseases and making many necropsies in cattle, horses and donkeys.

From Monteria I went to Cartagena, capital of the Department of Bolivar, at an elevation of five meters above sea-level. While there I encountered two cases of setariasis, one in a young ass; the other in a cow. A few days later I observed five cases, one in a donkey and four in calves at Turbaco, a town 24 kms. (14 miles) from Cartagena and 185 meters above sea-level. The same parasites were found in 15 carcasses of cattle in the slaughterhouse at Cartagena.

Throughout 1943, Doctor Lamos and myself observed that 8% of all the carcasses of cattle from hot regions, which we examined at the Bogota abbatoir, were affected. At the end of 1943, I was appointed by the Ministry of Economy to the position of Assistant Veterinary Pathologist of the Cattle Experimental Station of Nus, Department of Antioquia, 385 meters above sea-level. There I observed five cases of setariasis in calves and one in a horse. Lastly in the Department of Valle del Cauca I observed several cases at Sevilla, Zarzal, Bugalagrande, Palmira and Cali.

From the study of the morphological data encountered, Doctor Lamos and I agree with others concerning these parasites. The causa-

*Major political divisions in Colombia are called "departments." They correspond to states in the U. S. A.

tive agents of setariasis are: *Setaria equina* in horses, mules and donkeys, and *Setaria labiato-papillosa* in the cattle. This genus was discovered by Viborg (1795) and has been described by R. V. Reyes,[7] T.M.W. Cameron[8] and others.

Measuring of both sexes of Setaria was performed on 515 individual specimens from bovine and equine peritonea. The following dimensions were found: average length of male 6cm, female 11cm. The smallest male was 4cm in length and the smallest female 7.23cm; thus the female worm may be distinguished from the male by its greater size.

The parasites are characterized (see illustrations) by a smooth cuticule; in its anterior end by a cuticular ring surrounding the mouth notched to give appearance of teeth (Fig. 1).

Fig. 1.

Anterior end
Showing the mouth, oesophagus and genital opening

In an enlarged drawing of the anterior end of the body an esophagus can be seen with a short and narrow anterior part and a wider and longer posterior part. In the male the caudal end is sharply curved to form a hook and is spirally twisted and possesses two very unequal spicules which may be seen at the anal opening (Fig. 2). In the female the genital opening is cervical in position and the tail is also loosely spiralled. Commonly the female has two small lateral appendages near the tip of the tail (Fig. 3) so the tail appears to be trifurcate.

Setaria equina possesses in the peribuccal ring four protuberances, two being crescentic in outline, dorsal and ventral truncated (Fig. 3). *Setaria labiato-papillosa* also has four protuberances, but while the dorsal and ventral in *S. equina* are truncated, in this form the anterior borders are notched (Fig. 4), and moreover, the central lobe of the tail of the female ends in a spiny knob which resembles small teeth (Fig. 5).

In Colombia certain of blood-sucking insects, chiefly *Stomoxys calcitrans* are suspected of being natural vectors of Setaria.

The most severe cases have been observed in calves, young asses and foals, while in adults no clinical disturbances were noted, except a slight ophthalmia and conjunctivitis observed in five cases in cattle and two in foals. In the peritonea of many carcasses of cattle observed in several abbatoirs of the country (Cartagena, Medellin, Bogota and Cali) the animals affected by this parasite have presented in the peritoneal wall an

Male caudal end showing spicules and gubernaculum.

Fig. 2.

Female caudal end showing anal opening and lateral appendages

Fig. 3.

Setaria equina diagrams made directly from the microscope. These specimens were found in the peritoneal cavity of the Kentucky breeded ass, dead at MONTERIA, BOLIVAR, COLOMBIA. AGR. and CATTLE EXP. STA. of Monteria (Jan Ast. 1942)

aspect that resembles granular tuberculosis.

Case 1.—The case from Cartagena was found in a young ass, creole breed, and offered the following symptoms: hypothermia (97.7° F.), lack of appetite and a dull, dejected appearance. The animal ate very little if any solid food. Gauntness and weakness were shown by a wobbling gait. The mucous membranes were of a pale yellow color and the edges of the lips and tongue showed a slight papular stomatitis with lesions containing microfilaria. Necropsy showed numerous Setaria inside the peritoneal cavity and 894 individuals were counted.

Case 2.—The most severe case of setariasis was found at the Agricultural and Cattle Experimetal Station at Monteria, Department of Bolivar, in a six-year-old Kentucky jack imported from the United States (Fig. 6). During the last phase of the disease the temperature scarcely exceeded the lower limit of

normal (99.3°F). The animal wasted rapidly. The mucous membranes were pale. The donkey seemed ill and languid, and had a variable and capricious appetite. A red cell blood count showed a marked anemia (four million erythrocytes) a moderate leucocytosis and the blood picture of ten films showed 10% of eosinophils. The cardiac action was very irregular. All the examinations of feces contained ova of Strongylus, and Habronema. A thick film of fresh blood from the jugular vein was enough to detect microfilaria which were seen moving in large number (52 in the film). All treatment was unsuccessful. Sometimes the animal fell from weakness. It was very gaunt and went into complete collapse and died January 1, 1942. Although this jack suffered from strongyles and Habronema, it is thought they only aggravated his condition since the infestation was apparently light; the eggs being difficult to detect in the feces. It is thought the Setaria were the most important factor in his debility and death.

ANTERIOR END.
Fig. 4.

Female Caudal end showing lateral appendages and the central lobe of the tail ending in a spiny knob.
Fig. 5.

Setaria labiato-papillosa Specimens found in the peritoneal cavity of the heifer # 279 dead on December 22nd. 1942 at AGR and Cattle Exp STA MONTERIA BOLIVAR. COLOMBIA.

The most interesting phase was the post mortem finding: naked eye examination showed the parasites in very large numbers moving rapidly on all sides in serpentine fashion throughout the peritoneal cavity. It was possible to count 1537 individuals. Some parasites were encysted in the peritoneal wall. Ten nodules of the size of a pigeon's egg were observed in the stomach, containing small worms (*Habronema megastoma*) to the number of 198. The nodules were reddish and swollen.

Case 3.—A case, in a mare at Bugalagrande, was diagnosed and treated. In a thick film of blood from the jugular vein, 12 microfilariae were discovered with our portable microscope. The mare was treated with success with tartar emetic intravenously and is still living.

Twenty-five, 5cc samples of blood, each mixed with twice its volume of 0.05% sodium citrate, were brought to Escuela de Agricultura Tropical for laboratory procedures, such as detection of microfilaria. After centrifuging preparations of the sediment, were stained with hematoxylin.* Differential blood counts were made by counting 100 cells in each film prepared from uncitrated blood and stained with Giemsa's stain.

The problem of peritoneal parasite control has become confusing to veterinarians and husbandmen alike. There is no way of estimating the number of Setaria in the peritonea of living animals, because in many cases there are no clinical symptoms, but by blood examination it is possible to estimate roughly the number.

*The Secretaria de Agricultura and Fomento of Valle del Cauca maintains a laboratory at Escuela de Agricultura Tropical de Cali to assist veterinarians in the diagnosis of animal diseases. There is no charge for diagnostic service.

Map of Colombia showing the names of the Departments where the disease has been found.

Jose Gonzalez Alvarez

Many veterinarians have used novarsenobenzol and atoxyl and others are using potassium picronitrate, antimosan and various antimonial derivates. In our experience no benefit has been observed from the use of

Fig. 6. Heifer treated for setariasis in the Department of Valle del Cauca

those drugs. We have obtained good results from tartar emetic in saline solution, administered intravenously at intervals of three days (Case 3) to five days (Cases 1 and 2).

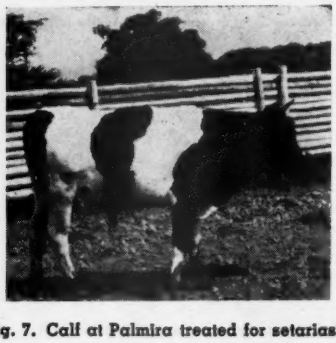

Fig. 7. Calf at Palmira treated for setariasis

We believe this drug has been the most effective against both peritoneal setariasis and blood microfilaria, because several animals treated with it are alive. Many other cases could be cited but in general they would not differ from the three cases cited.

Dr. Lamos Tascon, from Bugalagrande, reported that in that county he had observed eight cases of setariasis in cattle and later he and I together saw seven cases. Animals of all ages were affected. Deaths occurred mostly in calves, heifers and foals, also a few cows died. We made post-mortem examinations of two foals and five calves, the parasites found were so numerous that they were easily discovered without any precautions, in the contents of the peritoneal cavity.

We do not have sufficient data on aberrant Setaria, located in the lungs, testicles, lymph nodules or another internal organs, except the five cases observed in the eyes, to warrant a conclusion on the efficiency of a treatment against this type of parasitism.

Acknowledgment: The author wishes to express his thanks to Dr. Vicente Escobar Mendez of Monteria, Dr. Emiro Paz Arriaga of Cartagena, Dr. Pablo Perez of Turbaco, Dr. H. Watts Taylor, Dr. Jorge E. Bueno and Dr. Hector Lamos Tascon of Cali for their helpful cooperation in this work.

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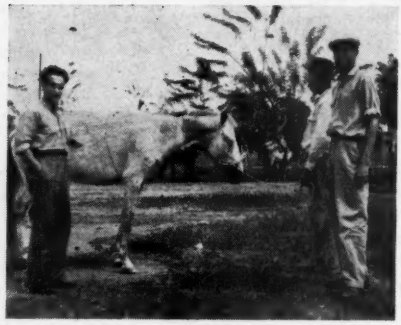

Fig. 8. Mare treated for setariasis at Bugalagrade. On the left Dr. Hector Lamos Tascon; on the right (wearing cap), Dr. José Gonzales Alvarez

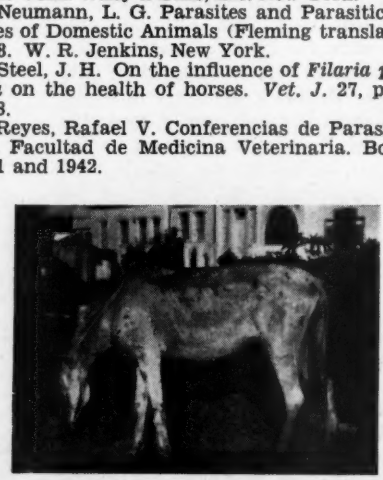

Fig. 9. Mare still under treatment at El Caso, the rest farm and animal shelter of the Society for the Prevention of Cruelty to Animals at Cali, Colombo

Parasites and Parasitic Diseases of Swine*

H. C. H. KERNKAMP**
University Farm, St. Paul, Minnesota

SWINE are the potential hosts to many parasites. Parasites that belong to 18 different genera and which include from 28 to 30 different species have been reported to occur in swine in the United States. Not all are of economic importance.

The natural or preferred habitat of each of the different species of parasites is quite specific. The skin, for example, is the preferred habitat for certain species and, for others it is the lungs, the liver, the kidneys, the stomach, the small intestines and the large intestine. The foregoing refers to the adult stage of the parasite, however, the host often suffers more from injuries caused by the migrations of the immature and developmental stages of parasites than from their depredations during the adult or reproductive stage. The following parasites and protozoa are to a greater or lesser extent, peculiar to the parts of the body designated:

Skin

Sarcoptes scabiei var. suis
Demodex phylloides
Haematopinus suis

Lungs

Choerostrongylus pudendotectus
Metastrongylus elongatus
Metastrongylus salmi

Liver

Fasciola hepatica

Tongue and Esophagus

Gongylonema pulchrum

Stomach

Ascarops strongylina
Hyostrongylus rubidus
Physocephalus sexalatus

Small Intestine

Ascaris lumbricoides var. suis
Macracanthorhynchus hirudinaceus
Crassisoma urosubulatum
Trichinella spiralis (adult stage)

Large Intestine

Strongyloides ransomi
Oesophagostomum dentatum
Oesophagostomum longicaudum
Oesophagostomum brevicaudum
Oesophagostomum georgianum
Trichuris suis

Small and/or Large Intestine

Endamoeba spp.
Endolimax spp.
Iodamoeba spp.
Balantidium sp.
Eimeria sp.
Isospora sp.

Kidney, Ureter and Perirenal Tissues

Stephanurus dentatus

Muscle (Including Heart)

Trichinella spiralis (larval stage)
Taenia solium (larval stage called *Cysticercus cellulosae*)
Echinococcus granulosus (larval stage called *hydatid cyst*)
Sarcosporidium sp.

Peritoneal Cavity

Taenia hydatigena (larval stage called bladder worm)

Generally speaking, the life cycles of the internal parasites of swine are not completed within the body of the host. The egg stage is usually shed or voided and undergoes a phase of development outside the body. The egg stage is very resistant to extreme cold, much atmospheric drying, considerable heat and most disinfectants. In fact, the egg may remain viable for several years awaiting ingestion by a suitable host.

Ascariasis

The most common and also the most widespread parasitic disease of swine is ascariasis. When a pig is said to have "worms" usually *Ascaris lumbricoides* infection is implied. This parasite is injurious to the host not only during the development and adult stage in the intestine, but it may cause considerable damage in its larval stage. In fact, the latter is often the more serious, due to injury to certain tissues and organs in the course of its migrations.

A short account of the life cycle of the Ascaris or roundworm of swine will help to understand some of the clinical, therapeutic and management problems that should be taken into consideration when dealing with this infection. A single female Ascaris is said to be capable of producing 250,000 ova in a single day and 25,000,000 in her lifetime! The eggs are deposited in the intestine and pass out with the feces. Under favorable environmental conditions outside the body — moist surroundings and atmospheric temperature of 90° F.—the eggs embryonate in about 10 days. The embryonated egg, when ingested by a pig, is borne to the intestine, where, in from two to three days, it hatches and a microscopic larva emerges. This larva migrates first through the gut wall and into the portal circulation which carries it to the liver. Its stay in the liver is variable, but it again enters the hepatic circulation and is carried to the lungs *via* the vena cava and right side of the heart. The migratory time from the gut to the lung may be as short as 10 to 12 days. Its stay in the lungs is also variable, but sooner or later it

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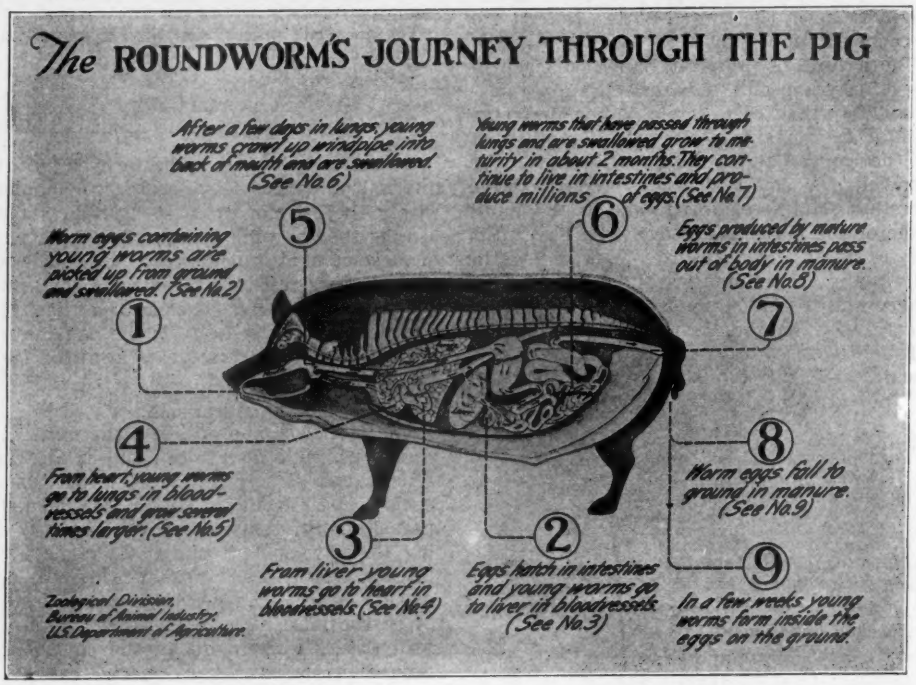
**Division of Veterinary Medicine, Minnesota Agricultural Experiment Station.

escapes into the air sacs and then finds its way up the bronchial tree and trachea to the pharynx, thence down the esophagus and into the stomach and finally, it again enters the small intestine. After reaching the intestine a second time the larva grows to maturity in


The ROUNDWORM'S JOURNEY THROUGH THE PIG
After a few days in lungs, young worms crawl up windpipe into back of mouth and are swallowed. (See No. 6)
Young worms that have passed through lungs and are swallowed grow to maturity in about 2 months. They continue to live in intestines and produce millions of eggs. (See No. 7)
Worm eggs containing young worms are picked up from ground and swallowed. (See No. 2)
Eggs produced by mature worms in intestines pass out of body in manure. (See No. 8)
1
2
3
4
5
6
7
8
9
From heart, young worms go to lungs in blood-vessels and grow several times larger. (See No. 5)
From liver, young worms go to heart in bloodvessels. (See No. 4)
Eggs hatch in intestines and young worms go to liver in bloodvessels. (See No. 3)
Worm eggs fall to ground in manure. (See No. 9)
In a few weeks young worms form inside the eggs on the ground.
Zoological Division, Bureau of Animal Industry, U.S. Department of Agriculture.

Courtesy U. S. Dept. of Agriculture

from three to six weeks and the females begin to produce millions of eggs. It has been reported that the circuit (gut, liver, lung, gut) can be completed in about six days, but there is no way of knowing just how short is the time under natural conditions.

Inasmuch as the Ascaris of swine must complete a migratory stage and a reproductive stage in the host, the infection problem consists of two phases. One phase we may define as the liver-lung phase and the other as the intestinal phase. Each phase is attended by a syndrome which is more or less characteristic. The liver-lung phase is manifested chiefly by symptoms that are referable to a pulmonary disturbance. Cough is the predominant symptom. When a "spell" of coughing begins, the cough is dry and rasping, but a little later it is loose and bronchial secretions are raised. The degree or amount of the infection usually determines the severity of the symptoms. Pigs that suffer from nutritional anemia are "hit" harder by the liver-lung phase of ascariasis than those not affected by anemia. Pigs which are vigorous and healthy at eight to 10 weeks of age are not likely to suffer much from the effects of ascariasis after that time.

The intestinal phase of ascariasis may or may not be accompanied by clinical signs of disease. As a rule, however, the general physical condition of the infected pigs is subnormal. They appear stunted. The skin is dry and harsh and the haircoat shaggy. The abdomen is distended and the abdominal muscles are tense, "pot-bellied." A pruritus of the skin is frequently displayed by a desire to rub or scratch against some object. The eyes are usually sunken, and the visible mucous membranes are pale. Not infrequently the mucous membranes are jaundiced, and many of these cases vomit considerably. When these signs are manifested, the probability is great that one or more of the worms have migrated into the bile ducts and stomach. The appetites of ascarid infected swine are quite variable. Some pigs continue to eat well, while others seem to partake of sufficient food only to maintain themselves.

Mention has been made of the fact that pigs heavily infected with ascarides, occasionally, continue to grow and develop without showing any clinical signs of infection. It is my belief,

where this occurs, that the infection took place some time after the third month of life and when the pig was otherwise quite sound and healthy.

The intestinal phase of ascariasis is amenable to treatment. Oil of chenopodium is a valuable ascaricide. The efficacy of the drug is increased when the ingesta in the bowel is absent or present in small amount. Therefore, when chenopodium is the choice of treatment, the pigs should be fasted for 24 hours prior to its administration. Water should be available at all times. The dose of chenopodium for a 50-pound pig is approximately 2.5cc suspended in two ounces of castor oil or mineral oil or, as Doctor Steenerson of Wilkinson, Indiana, suggests, in one ounce each of castor oil and raw linseed oil. The drug should be deposited directly into the stomach *via* a suitable stomach tube. As a precaution, we strongly advise against employing chenopodium for the treatment of ascariasis in pigs suffering from any inflammatory disease of the gastrointestinal tract, nor should it be given within two weeks following the serum-virus treatment for the prevention of hog cholera.

Dr. Benjamin Schwartz of the federal Bureau of Animal Industry reports that sodium fluoride is of value for the removal of ascarides from swine. This drug can be mixed with the feed, in the proportion of one part of sodium fluoride to 99 parts of feed. This is given only once. Here again, caution must be exercised that the proportion of drug to feed is as directed and that it should not be repeated until at least two weeks have lapsed.

Spindler, Zimmerman and Hill also of the B.A.I. state that the feeding of fluid skim milk in amounts sufficient to purge the pigs will, if repeated frequently (every two weeks), protect them against severe infections of Ascaris, whipworms and nodular worms. If this method of protection against these helminths is employed, it should be repeated every two weeks for three or four months.

The McLean county system of swine sanitation is a good program for the swine husbandman. It aims at breaking the life cycle of the parasite by preventing the ingestion of the ascarid egg. Much literature is available on the details of the system that must be followed, if it is to be successful.

Pulmonary Strongylosis

Pulmonary strongylosis is more common in swine than many realize. Three species of lungworms have been described as occurring in swine in the United States. These are *Choerostrongylus pudendodectus, Metastrongylus elongatus* and *M. salmi*. The adult parasite is a thread-like worm that inhabits the smaller bronchi and bronchioles. The life cycle of this parasite is different from that of the intestinal roundworm, in that an intermediate host is required. The intermediate host of the lungworm is the earthworm or at least certain species of earthworms. The lungworm deposits its eggs in the bronchi of the pig whence they are forced up to the pharynx by paroxysms of coughing. They may be expelled through the mouth with a cough or swallowed and pass out with the alvine discharges. When ingested by the earthworm the egg hatches and the larva undergoes certain developmental stages in the earthworm. Pigs are infected by ingesting infected earthworms which disintegrate in the stomach or intestine, releasing the lavae. The larvae in turn bore into the mucosa and eventually reach the lungs *via* the blood stream. After the larva reaches the lungs, it requires approximately six weeks to attain maturity and begin egg production.

The favorite location of the lungworm seems to be the smaller air passages of the diaphragmatic lobes of the lungs. They may be present in numbers so large as to literally occlude the air tubes, causing areas of atelectasis in the lungs, distal to the point of occlusion. The worms usually incite sufficient irritation to cause an inflammatory reaction in the bronchi which later extends to the peribronchial tissues and lung parenchyma. It may even progress to a bronchopneumonia of considerable severity.

Pulmonary strongylosis or lungworm disease is attended by symptoms of general unthriftiness and paroxysms of coughing. Attacks of coughing persist for a minute or two, coming on, as a rule, after the pig has exerted itself in some way, such as suddenly rising from a recumbent position or starting off at a gallop. The disease is readily recognized at autopsy. This is best accomplished by incising along the borders of the diaphragmatic lobes, about one-half inch from the free edge, and forcing the worms out onto the cut surface by applying slight pressure to the lung.

Generally speaking, the treatment for this disease is not satisfactory. Intratracheal instillations of oil of turpentine and creosote compounds have been suggested, but we have not seen any report attesting to the real value of instillations. The mixture recommended consists of *olei terebinthinae* and *olei olivae*, of each 100 parts and 10 of *creosotum* (Pearson's). The dose is from two to three cubic centimeters, injected intratracheally. Lungworm disease is seldom fatal; and, as a rule, infected pigs eventually recover at least to a point where they are not troubled by a cough. It is advisable to provide a highly nutritious

suitable ration, thereby tending to improve their general physical condition and by this means increase also their general resistance to disease or other unfavorable influences.

Acariasis (Scabies or Mange)

Sarcoptic mange is a contagious and transmissible parasitic disease of the skin. It is characterized by the formation of vesicles, pustules, crusts and excoriations, which, in extreme cases, provoke an intense pruritus. The disease is usually spread by contact, but it may be transmitted by intermediate objects such as brushes and brooms used for brushing infected swine and by infected bedding or walls or posts, etc., against which infected pigs have rubbed. The transmission by intermediate means must occur without the lapse of much time since mange mites soon perish when off the body of their host.

The cause of sarcoptic mange, *Sarcoptes scabiei* var. *suis*, is a small acarus (mite) scarcely visible to the unaided eye. The female mite, after copulating, burrows into the outer layer of the skin and deposits from 10 to 25 eggs in the burrow or gallery in the course of from one to three weeks. She then perishes in the burrow. The eggs hatch in from three to 10 days and the young mites develop to maturity in another 10 to 12 days. Upon reaching maturity, they migrate to the surface of the body to mate, either by way of the burrow or by forcing their way up through the roof of the burrow, which is usually close to the surface and quite thin by the time the mite is ready to emerge.

Sarcoptic mange is readily apparent clinically, in cases where the disease has progressed far enough to produce symptoms. The urge of the host to rub and scratch is characteristic, and is often displayed before any definite macroscopic changes can be noted in the skin. The intensity of the pruritus depends largely upon the extent and severity of the infection. The macroscopic lesion begins as a small vesicle. This soon ruptures, and a small drop of serum is discharged which dries to form a yellowish or brownish crust. In some instances, the vesicle contains purulent material instead of the serum. When many of such vesicles and pustules are present, they cause the skin to increase in thickness and become harsh and to form wrinkles or folds in which small crevices or fissures occur, and a moist and semi-greasy substance collects in them. In many cases, the skin becomes scaly and scurfy as the result of an exfoliation and excoriation of the superficial layers. The hair is usually shed in an affected area. In extreme cases, emaciation and other signs of unthriftiness are manifested.

The skin in the region of the eye is often the first to show evidence of mange, and the medial surfaces of the legs and ventral surface of the abdomen and thorax are areas that become involved early in the course of the disease. In extreme cases, the infection may spread over practically the entire surface of the body.

A positive diagnosis is made by finding one or more of the parasites by microscopic examination of skin scrapings. It is important that a good sample be collected. It is advisable to obtain the scraping from a moist area. In the event a microscope is not available, a reasonably satisfactory method is to spread the scraping over a dark cloth or paper, over a warm surface, and observe closely for small whitish to yellowish-white objects that move away from the central mass. The probability is strong that these will be Sarcoptes. A diagnosis of mange should not be made merely because the pig manifests a scurfiness of the skin. There are other factors that cause a disease of the skin, and oftentimes the lesions are very much like those of mange. If it is sarcoptic mange with which one is dealing, the parasite can be identified, positively, by suitable procedures. Many times I have seen a diagnosis of mange made because the skin looked "mangy," but every effort to demonstrate the parasite ended in failure.

Sarcoptic mange is not difficult to eliminate from swine if an earnest effort is made to do so. Many methods of treatment are available, which, when properly used, give satisfactory results, as a rule. Some therapeutic measures are designed for the treatment of individual or small numbers of swine; others have been developed for use when large numbers are treated. The lime-sulphur preparations are highly satisfactory and are obtainable in commercially prepared forms. The effectiveness of the lime-sulphur dip is greatest when used at temperature of 95 to 100° F. The pig should be held in the tank or vat for about three minutes. It is usually necessary to dip them two or three times at intervals of from six to seven days. Before the pigs are returned to their lot or pasture after the treatment, it is advisable to clean the quarters thoroughly by removing the bedding and litter and scrubbing the walls with strong lye solution.

Crude petroleum is an effective acaricide and is best applied to swine with a swab or brush. This is useful where only a few animals are to be treated. A mixture of soap and crude petroleum is another efficient medicament. It is prepared by dissolving five pounds of a good quality soap in 10 gallons of water and then mixing with 20 gallons of crude petroleum and lastly adding water sufficient to make 100 gallons.

Common Diseases of the Domestic Rabbit

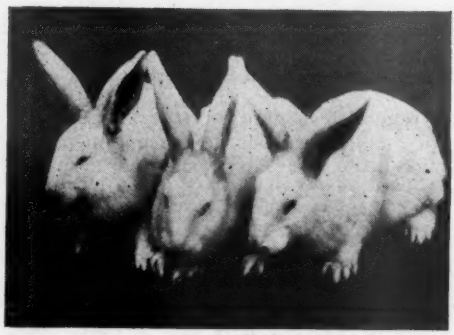
By J. M. HAGGARD
Altamont, Kansas

TO KEEP abreast of modern trends in the vast animal industry, it is generally recognized that the veterinarian must be a diligent student and a constant reader of his professional literature. His work often involves doing things of which he never dreamed in college days. At this time vast new fields are opening to the profession. Some of these are large enough to lead to specialization. A detailed study of these new branches will pay the veterinarian in dollars and cents, as well as in satisfaction in having rendered a useful service.

Owing to the meat and fur shortages, the rabbit industry received a great boost during the war. Already having a fine start, it is now a popular and growing enterprise for many thousands of persons. Most of them, learning rabbit husbandry from experience and from older hutch keepers, feel confident of solving feeding and housing problems but when disease strikes, their reliance must be placed upon the veterinarian. Herein lies an opportunity for him to serve an eager clientele. The least this industry should expect of the professional man is, that he have a knowledge of the common rabbit diseases.

Examination

A healthy normal rabbit has a vivacious manner, bright eyes and a smooth coat. The natural apertures of the body should be free of catarrhal and other discharges and the skin should be free from scurf. The feces normally are hard firm pellets. The normal temperature is 100.8° F. The respiration and pulse rates vary so greatly, from excitement that they are of little diagnostic value to the examiner.



U. S. Dept. of the Interior
Make a careful examination of the skin and apertures

A routine method of checking a rabbit should be adopted. Get the habit of picking up the animal by the loose skin over its shoulders with one hand and if it be heavy, place the other under the hindquarters. *Don't* lift a rabbit by its ears.

Notice whether or not there are any symptoms of nasal catarrh, conjunctivitis or a discharge from the vulva or penis. Inspect the ears for canker. Examine the skin for fleas, lice, eruptions or scurf by turning the hair back. Examine teeth for irregularities. A fecal examination may be run to check for internal parasites. Check the mucous membranes for anemia or icterus.

Sanitation and Hygiene

Before discussing the diagnosis and treatment of disease, the veterinarian should be reminded that constant maintenance of good sanitation and hygiene of the entire rabbitry is indispensable to success in raising rabbits for profit. To keep rabbits healthy, their hutches must be kept scrupulously clean and must be disinfected at least twice a week. Ample protection from strong drafts and a sufficient supply of fresh air must be provided. Dryness in the rabbitry is essential. Rats and mice should be excluded from the rabbitry because they are potential carriers of disease.

The purchase of used hutches is not advisable. Never purchase a rabbit without making sure it is free from disease and parasites. Then quarantine it as an extra precaution. Lye and hot water, 1:1000, are good agents to use in scrubbing hutches. If the hutches are metal they should be gone over with a blow torch to rid them of oöcysts of coccidia.

Administration of Medicines

When it is necessary to give medicine for internal use a powder is probably the most desirable form in which to administer it. The easiest way to handle the rabbit is to grasp it gently by the back of the neck with one hand and place the other hand on its hips. Then turn the rabbit on its back and place the right arm over its hind quarters so it cannot kick. One hand should be used to hold the head and the other to administer the medicine. Gently press the jaws apart with thumb and finger and place the powder well back on the tongue. It is wise to place a carpet or burlap under the rabbit to prevent soiling its fur.

Liquid medicines for the nostril are most easily applied with small oil can or an eye dropper. Gently squirt the medicine well up into the nostril and then allow the rabbit to stand on its feet to catch its breath and prevent the liquid from getting into its lungs. An

eye dropper can also be used to place liquids well down the throat.

Nasal Catarrh

Probably the most dreaded disease attacking domestic rabbits is "snuffles" (nasal catarrh). The cause of snuffles may be any one of several organisms. *Pasteurella cuniculicida, Brucella bronchiseptica* and coccidia all play important roles. However, some believe the coccidia to be a secondary invader and present because of the inhalation of dusty fecal particles by the rabbit.

These organisms are probably present in the nasal passages of the rabbit at all times and become pathogenic because of lowered resistance of the animal. Therefore the veterinarian must stress sanitation and proper housing conditions at all times.

At first the nostrils are a little more moist than usual and later a thin, watery discharge may appear which becomes thicker as the disease progresses. Snuffling or coughing is generally present. The rabbit will wipe its nose with the forepaws, and in time the fur on the forequarters becomes soiled and matted. In severe cases mortality may be considerable, though death is more often the result of complications than of a simple case of snuffles. If pneumonia or hemorrhagic septicemia organisms gain an entrance, death may soon follow.

Sneezing may also be induced by dust, smutty grain, or other irritating substances such as ammonia fumes. Close attention should be paid to the symptoms, so that proper steps may be taken to correct the trouble.

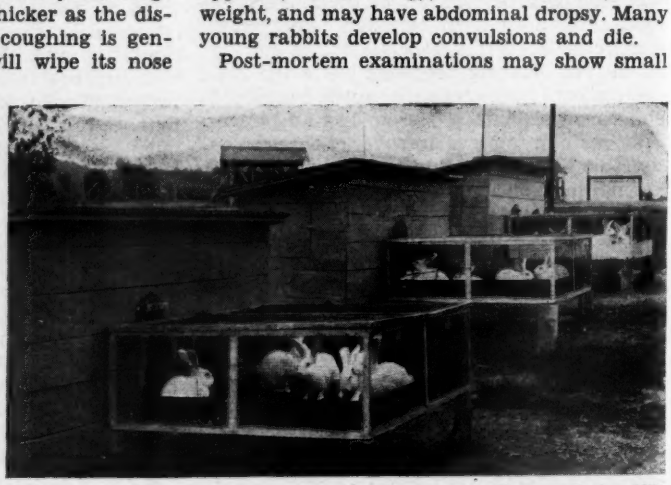
As soon as any of the symptoms of snuffles appear, remove the animal to clean, dry quarters where it will have plenty of fresh air and at the same time remain warm and protected from drafts. In case of pneumonia the animal may be wrapped in a blanket or cloth to keep it warm and dry. Give it plenty of green feed, clean water and wholesome, palatable hay and grain. The floor may be covered with sawdust, but any bedding used should be changed as often as necessary to keep the hutch clean. Remove manure promptly; ammonia fumes from manure left in the hutch are sufficient to cause considerable irritation of the nasal passages. Musty, dusty, or smutty feeds are to be avoided.

One of the most promising treatments is 10 drops of linseed oil daily. This oil is rich in linolenic and linoleic acids. A cure in seven to nine days has been reported from this treatment. There is a theory that a deficiency of these, fatty acids (linolenic and linoleic) permits the bacteria that cause snuffles to set up an infection. Experiments indicate that a cure of snuffles can be brought about by feeding a substance rich in the fatty acids mentioned. If the results of these experiments hold true in practice, then the rabbit raiser may be able to prevent snuffles by feeding enough of these fatty acids to prevent the appearance of what may prove to be a fat-deficiency disease. As a means of preventing snuffles, 2% cod-liver oil has been added to the grain ration with good results, according to Ibsen.

Coccidiosis

This disease has very distinct symptoms. In advanced stages the rabbit manifests a poor appetite, lacks energy, has a dull fur, loses weight, and may have abdominal dropsy. Many young rabbits develop convulsions and die.

Post-mortem examinations may show small hyperemic areas of about the size of a pin point or pin head on the mucous membrane of the intestines. The blood and flesh may have a pale, watery appearance.



Courtesy Purina Mills

Wire floors with sliding trays underneath aid in preventing coccidiosis

In some cases the liver shows raised white areas which give coccidiosis the name of "spotted liver." Apparently healthy rabbits sometimes have such liver spots. Presumably such rabbits have contracted the liver form of coccidiosis, which occurs in a chronic condition, and have recovered from it.

Intestinal coccidiosis is associated with *Eimeria perforans* Leuk. *(Coccidium perforans)*. This parasite may cause death of young rabbits in six to 15 days. The liver form of coccidiosis is due to *E. stiedae* Lin. *(E. cucinuli, C. cuniculi, C. oviforme)*. This type of coccidiosis (hepatic) may cause death in three weeks

to a month. The intestinal form of the disease probably causes 95% of the mortality.

The seriousness of coccidiosis lies in the heavy mortality it produces among young rabbits, from six weeks to two months of age. The best authorities in this country and Europe have stated that the disease is incurable, and any treatment may do more harm than good, because infected animals may spread the disease while being treated. In view of these experiences the best policy would seem to be to get rid of all rabbits that show any indication of coccidiosis. Even such symptoms as slobbers should be regarded with suspicion and the rabbit isolated until it is definitely known whether or not coccidiosis is going to develop.

The control of coccidiosis consists of killing and burning or burying in quicklime all infected animals. The hutches should be cleaned thoroughly at least twice each week to break the reproductive cycle of the parasite in the manure. It takes several days for the oöcyst in the manure to develop into infective form, usually about three or four days. If the manure is removed before the parasite reaches an infective stage, and the rabbit raiser is careful to prevent any of the feed or water from coming into contact with the manure, the healthy young rabbits stand a good chance of escaping infection. No feed from fields that have been fertilized with the infective manure should be used for rabbits, and no hutch or carrier should be used until it has been thoroughly disinfected. Any new rabbits brought into the rabbitry should be placed into quarantine until they have established a clean bill of health. Since contaminated feed and water may carry the infection to healthy rabbits, it is very important to build hutches with hay racks off the floor. All vessels for grain and water should be kept free of droppings and sterilized frequently with scalding water.

Quinine has been mentioned as a possible remedy for coccidiosis. It is administered in doses of 0.1 grain daily until the symptoms disappear. But more evidence on a larger scale is necessary before any treatment can be accepted as dependable.

Pseudotuberculosis

Occasionally tuberculosis may attack rabbits, but it is not ordinarily a prevalent disease. The typical nodules or tubercles which are sometimes seen in lungs, liver, intestine and spleen may indicate an infectious disease similar to tuberculosis known as "streptobacillary pseudotuberculosis." It is caused by a specific organism, *Corynebacterium rodentium*. Weakness, emaciation, lack of appetite and labored breathing are the usual symptoms. Death ordinarily follows. No treatment is recommended. Kill the affected animals and keep the quarters well disinfected.

Vent Disease or Rabbit Syphilis

This disease is due to *Treponema cunicula*, a spirochete similar to the *Treponema pallidum*, which causes human syphilis. The germ has an incubation period of three to 10 weeks, after inoculation. The incubation period from natural exposure is variable. Vent disease is spread rapidly by an infected buck. A buck may become diseased if bred to an infected doe. Rabbits with vent disease are not eligible for exhibition and should not be used as breeders.

Vent disease should be controlled by isolating all diseased stock. The premises should be sterilized thoroughly. A treatment that has been used is the injection of sulfarsphenamine, a well-known remedy for syphilis. Perhaps it would be cheapest to kill all but the more valuable of the infected rabbits.

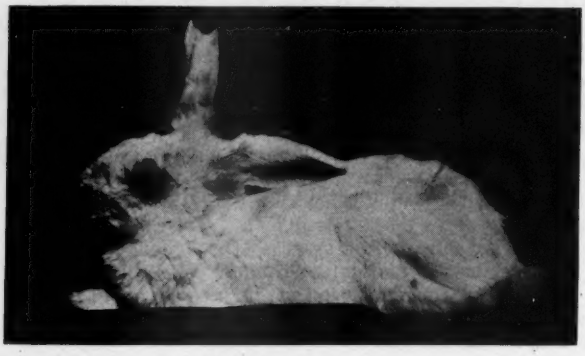
Ophthalmia

Blindness of the young and other eye trouble is probably due to infection and may be treated accordingly. The adults have a discharge from the eyes and in the young the eyes may be swollen. Sometimes red pimples occur around the eyelids and young animals may become totally blind.

Affected animals should have their eyes washed with boric acid, one tablespoon of powdered boric acid to one pint of water. A 1% solution of Mercurochrome solution has been used with safety in the eyes of rabbits.

Infectious Myxomatosis

The mortality from this disease is very high. The first symptoms are swelling in the region of the nose and lips, and external genitals,



Myxomatosis in the rabbit showing excessive edema of muzzle and ears

and inflammation of the conjunctiva. A purulent discharge develops in the nose and eyes which is capable of spreading the disease. The ears become thickened and, as a rule droop. Affected rabbits that live longer than a week or 10 days develop nodules around the eyes and nose or on the ears. In examining rabbits dead of myxomatosis, it will be noticed that the lymph nodes and spleen are usually enlarged. At present, no satisfactory treatment is known.

Tularemia (Rabbit Fever)

Tularemia is a serious disease that attacks several species of wild animals including the wild rabbit. It also infects man, either by contact with the carcasses of diseased wild rabbits or by being carried by certain biting insects that have fed upon infected animals. The *Pasteurella tularensis* is the cause of this disease. Since rabbit fever usually causes death of the rabbit in the course of six to nine days, it would be well to isolate any suspected case for a period of about 10 days. In no case should diseased animals be handled except with rubber gloves. No cure for tularemia in rabbits is known. No cases of natural infection of domestic rabbits have been reported.

The carcass of an animal dead of the disease usually shows necrotic spots in the liver and spleen. Laboratory animals infected with tularemia may also show swollen lymph glands, which may contain pus, in the abdomen and groin.

Sore Hocks

This trouble has been attributed to the rabbits stamping its feet in filthy, wet hutches, which causes the hocks to become irritated, infected and inflamed. The heavier rabbits seem to be most subject to hock injuries. Possibly part of the trouble may be due to wrong methods of feeding, particularly feeding too heavily on barley and other feeds high in carbohydrates. The use of hard or rough surfaces on the floors and the lack of sanitation in the hutches may be considered contributing factors to hock injury. Deformity of the legs and general weakness of the rabbits should not be overlooked in attempting to find a cause for sore hocks.

Clean up the hutches. Then disinfect the floor thoroughly, either with a blow torch or with scalding water and soap or lye. Put in clean straw or hay bedding. The hair may be clipped from the hocks and the parts cleaned with warm soapy water, dried, then coated with a soothing antiseptic ointment, every other day until healing is well advanced.

Urine Burn

Small denuded areas around the external genitalia of domestic rabbits caused by irritation from urine are frequently confused with vent disease and diagnosed as such. In severe cases of urine burn, however, the small raw areas may rapidly enlarge and coalesce until the entire area is denuded of hair and skin. These areas may become infected with contaminating organisms and result in a purulent discharge. Unless the condition is given prompt attention there may be a fatal termination. In less severe cases the lesions become covered with a heavy scab, and attempts to remove these without precautions may cause severe hemorrhage. It is this type of case that closely resembles and is most frequently mistaken for infectious spirochetosis.

Urine burn usually results from the animal being in constant contact with urine-soaked bedding or waste material on the floor of the hutch. A similar condition has been observed in rabbits following an excessive use of caustic disinfectants in cleaning the hutch floor.

The prevention of urine burn and resulting infections depends entirely upon sanitary precautions, such as keeping the hutch free of urine-soaked bedding, hair mats, and manure. Mild cases usually recover promptly without other treatment than removal of the cause. More severe cases are successfully treated with tincture of iodine.

Veterinary Practice III

By E. T. BAKER
Moscow, Idaho

Starting Practice

TO "bust into practice" right out of college with no practical experience is to bargain for a large amount of grief. There are many little "wrinkles" essential in smooth and successful public contacts that only experience can teach.

Immediately following graduation I spent four years with two state colleges, and at one of these institutions I had the good fortune to work with a seasoned practitioner. He had been in general practice for about 10 years before taking a teaching job, due to arthritis in one hand, which interfered with his clinical work.

He explained to me how he arrived at a reasonable fee for services, and how to deal with the client. He also gave me confidence in myself for he said:

"Put yourself in the owner's place, and act accordingly. If you have a little luck, you'll have all the work you want." He also instilled into my somewhat vacant mind, the value of having a better line of treatment than the owner or the neighbors could figure out. Then, best of all, he explained how some people would not like me, even if I had the best of luck with their animals, while others would take a "shine" to me even under the most adverse circumstances.

He told me he had no set rules for setting a fee, and that he tempered the shorn lamb to the amount of wind that happened to be blowing around the barn. Thus, the rich paid a few more pennies than the poor, and for many he forgot even to make a charge. He also pointed out that some persons felt insulted if they were charged too little. Their animals were of superior breed and required expensive medicine. For example, he looked at an ear canker in a pooch owned by a very wealthy and well upholstered lady. She was a leader in society and never underestimated her importance or that of her pocket book. Our colleague gravely examined the ailing flea hound, and informed her he had never seen such a serious case in his long and varied career. He added the poor little precious pet would have expired long ago had it not been for her expert care and wonderful nursing. She left, feeling very grateful and appreciative of his professional skill and was soon back for more of the same.

He treated children's pets for nothing, and I have seen him spend more time and attention on a poor widow's cow than on a thousand dollar purebred bull.

In addition to associating with this past master of the animal healing art, I had two more years with a state university, doing teaching, experimental work, taking care of the college live stock and engaging in extension work in all parts of the state. This gave me an opportunity to meet all the practitioners in the state and I often went with them on calls and picked up many valuable pointers in this way.

Best of all, this experience taught me some of the art of getting along with the public and attending to my own business, instead of trying to be a big man in my community. It also impressed me with the philosophy of the average country practitioner. He ignored many of his troubles, such as the unscrupulous quack or qualified competitor. He was friendly with the patent medicine peddler, for his good will was better than his enmity. He played fair with the druggists, for they are good fellows, as a rule, and he even allowed the over zealous county agent all the rope he needed to hang himself.

Getting Started

The hardest part of one's career is in "getting started." Various circumstances surrounding this painful process may play an important part in one's future. Let us contrast the careers of three young practitioners of equal ability:

1. Doctor A takes over the practice of a well liked, competent veterinarian who has either died or retired. Thus, the young "Doc" starts in where the old one left off. The business is there, ready and waiting, and all the young doctor has to do, is to have reasonable success at the start.

If he happens to run into some hopeless cases and they die, clients will shake their heads and whisper:

"Old Doc would have pulled them there critters through."

The truth of the matter was "Old Doc" knew how to pick his cases, and how to side step the hopeless ones. However, if our new practitioner is competent and sincere, he will outlive this setback and soon win the confidence of his community.

And if he happens to be married another important factor is his wife's personality. If she is "uppity," and disagreeable, and "don't like small town hicks," the tenure of our colleague in that locality will be brief. If, on the contrary, she happens to be friendly and has the gift of making a good impression with the

neighbors, his success will be more assured.

Thus, in "making good" Doctor A has about 85% in his favor without any special qualities of his own.

2. Doctor B locates in a community where there is already an established and experienced practitioner capable of handling all the work in that territory. In case the first veterinarian begins to fight the newcomer, the latter has a very unpleasant start in life and it may embitter him for all the rest of his years. Events soon bring the rival practitioners

BEFORE THE DOCTOR COMES

While Pa and Ma see what the "doctor book says" the kids and the dog make a close examination of the patient—down on the farm

to "bucking each other," instead of being able to treat their patients in a thorough manner.

In a short time there are two armed camps, and the cohorts of each tell how "Doc fell down on treatin' Joe Henry's Guernsey cow an' she kicked th' bucket, By Heck." Next, comes fee cutting and all kinds of dirty work at the cross roads. Finally, it becomes a struggle for the survival of the luckiest until one moves away to a new location—disillusioned and discouraged. Often, he may take the first salaried position in sight. Thereafter, he looks on private practice much like a war veteran regards some of the foreign lands he has fought in.

Doctor B had at best only 50% of a chance to succeed.

3. Doctor C locates in a "hard scrabble" territory, where, in good years, he may make a modest living. But he is industrious and thrifty and, pretty soon, picks up various sidelines of practice, such as a state deputyship or meat inspector job, or doing some contract work for a big outfit.

His income is not large but his living expenses are low, so that he makes as much net as many others with a larger income. New industries pop up in his community and, as he is on the ground, he benefits thereby.

In a few years he is comfortably well fixed, but not wealthy. He has had good luck, good health and has made the most of his limited opportunities.

Doctor C had only 35% in his favor, but he improved each shining hour and made good—even with the odds against him.

Thus, out of every 100 young fellows who start in practice, a certain number will make good; some will just exist, while others will fail. In this, good fortune or bad fortune will play a vital part. Some mediocre men will succeed in spite of their short comings while others, more efficient, will go down trying to overcome the impossible.

However, in summing it up, the writer thinks choosing a favorable location plays the most prominent part; being prepared, the second, and a combination of good luck and good health, the third.

Demands of Practice

Holding a practice after gaining it, is something else. Many competent men have lost a good business by not attending to it.

For example, the same man who serviced my Buick in 1914 is still keeping my car roadworthy. I know that I can depend on him any time of day or night. In return for his unfailing reliability, I have probably paid him over $10,000 in 30 years.

Elsewhere I have mentioned that I do not play golf on account of the many emergency calls during the summer season. I bowl in winter, when business is not so brisk. Not long ago, a client for whom I have been doing work since 1913, said to me:

"Doc, you'll never know what a relief it was to me to know you were on the job when I might need you."

A pleasant home and office will make the days pass swiftly by. A few hobbies will keep you from thinking of your troubles. Regular hours and sane living will keep you in reasonably good health. Keeping your expenses less than your income will reduce financial worries. Avoiding speculation and "get rich quick" schemes will allow you to work less and have more money. And, finally, by attending to business the best you know how and by using the most uptodate line of therapeutics you will have a sense of satisfaction of a job well done.

Therefore, in conclusion, the first two years may "make or break" one. There is a verse by Joseph Addison Alexander which explains my philosophy of life:

"There is a time, we know not when,
A point we know not where,
That marks the destiny of men,
For glory or despair."

(To be continued)

Clinical Reports

Abscess and Furunculosis in a Dog

A 13-month-old, registered Doberman pinscher bitch, weighing about 40 pounds was presented for treatment of a large swelling behind the right eye.

The patient had a temperature of 104°F., showed marked emaciation, cutaneous swellings around the muzzle, head and legs in addition to the large swelling behind the eye. The contents of these swellings was bloody and purulent.

The large swelling was diagnosed as a subcutaneous abscess and surgical treatment was decided upon as soon as the surgical risk decreased to a point that made it advisable.

Thirty grains of sulfathiazole was administered orally at once. Thereafter 7.7 grains of sulfathiazole and 10,000 units of penicillin were administered every four hours. This was continued for 24 hours. The temperature dropped to 103.2°F. on the following day at which time surgical treatment was regarded as being feasible.

Furunculosis in a Doberman pinscher

Two and one quarter grains of nembutal, administered orally, produced very satisfactory anesthesia since the bitch was very gentle. The patient was restrained in dorsal recumbency and the abscess incised behind the second upper molar, curetted and drained into the oral cavity. A gauze tampon containing sulfathiazole ointment was inserted into the opening and removed 24 hours later.

Material aseptically collected from this abscess revealed a mixed infection of *Staphylococcus aureus* and *Corynebacterium pyogenes*. The skin lesions were diagnosed as furunculosis. Sterile swabs of the exudate of these swellings when plated on blood agar media revealed the presence of the above named organisms, and also the presence of a white fungus. This fungus was identified as *Trichophyton metagrophytes*,[1] the etiological agent of ringworm in cattle and which, on occasion, infects other domestic animals and man.

Each small abscess around the head and legs was incised, drained and swabbed with tincture of metaphen and sulfathiazole ointment, and 2,000 Oxford units of penicillin was applied locally on cotton packs. Also 10,000 units of penicillin was packed in the larger abscess which drained into the oral cavity. This procedure was continued for several days. After some improvement had taken place the penicillin was discontinued and the affected areas were painted daily with a solution of tincture of iodine and salicylic acid in alcohol, and also with sulfur dressing, until the patient was discharged.

DAVID N. SCARR

West Concord, Minn.

* * * *

Ulcers in the Abomasum of a Cow

I was requested to make a post-mortem examination on a four-year-old, Jersey cow. The history was that every time the cow was turned on pasture she would act as though she had indigestion and each time she was taken off pasture and put on dry feed the symptoms would leave and the cow appear normal. This condition lasted two years prior to her death, which occurred during a similar attack.

The necropsy revealed numerous ulcerated areas in the abomasum. The ulcers ranged in diameter from two inches to pin point size. Most of them extended into the muscular wall of the abomasum. One ulcer had perforated through the entire wall of the abomasum leaving a hole ¼-inch in diameter. Evidence was present of old healed ulcers as shown by the presence of numerous scars on the mucosa. The ulcerated areas were confined to the anterior half of the organ on its ventral surface. As a result of the perforated ulcer there was a slight amount of food material on the serous surface of the abomasum and in the abdominal cavity. The mucus membrane of the abomasum showed a typical hemorrhagic gastritis with a brick red color. A bloody-serous fluid made up part of the content of the abomasum.

[1] Identified by C. W. Emmons, Principal Mycologist, U. S. Public Health Service, National Institute of Health, Bethesda, Md.

The abdominal viscera were reddened and inflamed on the serous surface showing an acute peritonitis due to the perforating ulcer allowing leakage of food material in the abdominal cavity.

The folds in the omasum showed some congestion.

A chronic pericarditis was evidenced by thickening of the pericardium and the muscular wall of the heart.

The acute peritonitis set up by the food material in the abdominal cavity was the probable cause of death.

The etiology of the ulcers was unknown. The pericarditis had no relation to the ulcers in the abomasum.

A. L. MAXFIELD

Bonner Springs, Kans.

An Unforgetable Experience in Oklahoma

In every veterinarian's practice some experience occurs that will never be forgotten. This one, though it happened several years ago, haunts me yet.

Neither the day, nor the call itself seemed unusual. A "widder woman" called me to her ranch in the rough canyon country 20 miles away to relieve a case of dystocia in a heifer.

When I drove up to the Ranch, the situation seemed ideal. The fetus was in posterior, dorso-spinal presentation, halfway into the outer world and the dam, though obviously wild, was properly enclosed in a circular four-wire corral.

With complete confidence, and aided by my client's 12-year-old nephew (all the male help available in the dark war years) I shook out a loop in my lariat and whirled it around my head several times in the best manner of a Brooklyn cowboy, transplanted to the wide open spaces. As I approached, the patient snorted and came at me in the true man-eating manner of certain strains of Herefords. Mayhem was mirrored in her red eyes. As I side stepped, she just picked up speed, and with an incredible leap, cleared the top wire of the corral and high tailed it into the 3,000 acre pasture, which was well cut up with canyons 100 feet deep.

I went back to the house and inquired for a good cow horse. "We have one, Doc, right yonder in the barn." I found it, a spavined, 15-year-old, 850 pound mare. I saddled her more or less inexpertly, hoisted my tender posterior into the leather, grabbed a five-foot obstetrical chain and headed in pursuit of the runaway dystocia, trailing my lasso behind me.

The cow had by this time settled down, and after a jolting mile and a half, I managed to ride alongside, and by sheerest accident flip my rope over her head. "Hmm," I said to myself, "Nothing to it, I'll drag her over to a fence, snub her down, and deliver the calf."

As I took a turn of the rope around the saddle horn, and started to take up the slack, the patient stood very quietly. As she felt the rope tightening, she suddenly bolted while my horse was still broadside to her. The hapless mare, not knowing that a horse should face a cow trying to get away, was jerked down flat on her side, with me frantically scrambling to the top. Fortunately, despite a flurry of hoofs, I found myself free of the saddle and unscathed, hanging grimly on to the rope, which had slipped off the saddle horn. I was towed by my badly frightened patient for half a mile in record time, my strides averaging 15 to 20 feet. I managed to let go and limped back to my badly shaken mount to resume the pursuit, when pulse and respiration subsided to only twice normal.

I was able to approach the cow fairly easily, but my problem was to get the rope onto the saddle horn. I would ride up as close as possible, shake my feet loose from the stirrups, and dive to the ground to catch the rope, hoping to remount and loop it around the saddle horn. The cow was too fast and my every attempt was rewarded by being hauled in her wake until I could let go. After five or six such attempts, the situation and the author were deteriorating fast. Suddenly a white hot wrath overwhelmed me, and cursing the day I was born and most of all the day I left Brooklyn, I resolved that I'd get that calf or —go back to Brooklyn.

Meanwhile the patient had galloped into a vertical walled, deep canyon. I followed, apprehensive of tumbling headlong to the bottom. I left matters to the horse and didn't open my eyes until we reached bottom, alive but trembling. My quarry was peacefully meandering through a plum thicket. The trees were so thick that I was able to dismount and snub the rope to a few trees, and Eureka! I had her.

Whenever I approached the cow on foot, she would whirl and try to disembowel me with expert thrusts of her horns. But, like all range cattle, she was far more docile to a horseman. As a result I had to perform my obstetric operation as an equestrian. I looped my chain over the saddle horn and after numerous attempts, managed to encircle the partly decayed fetus above the elbows. With a fierce shout, I smote my heels into the horse's flanks. The horse went one way, the cow the other and yippee, I had the calf. The putrid fetus came

swinging out on the end of the chain, and to my horror, kept flopping against my mount. I need not describe the reactions of a horse, even a well-trained one, when it feels a wet carcass entangling its legs.

Off went the mare in a series of spine shattering crowhops, while I tried to loosen the firmly looped chain from the saddle. I'll never know how I did it or what happened, but our grisly burden was shaken loose and after a wild gallop of a mile, I drew my mount to a halt. Coney Island was never like this.

I rode up to the house, collected my fee, and then remembered that two miles away, a young mother was still snubbed to a plum thicket. My horse was turned over to the nephew, I hunted up a corn knife, and told him to cut the cow free, near her head if possible, and bring me the rope. In a corner of my clinic reposes five feet of rope. Some day I'll have it framed.

DAVID JACOBSON

Woodward, Okla.

Hordeum Pusillum Heads Injure Dog

July 19, 1945, a white, female bull terrier, 3½ years of age was presented for examination. The owner complained of a partial paralysis of the right hind leg and a swelling anterior to the tuber coxae. The area was examined but no external injury or discharge could be detected. The bitch's temperature was 103° F. She was sent home with instructions to return her if she did not recover within a week.

August 11th, this animal was returned to the hospital with a fistulous tract extending down the anterior margin of the sartorius muscle. The discharge was of a serous nature. Tincture of iodine was applied locally and the dog remained in the hospital until the 16th, by which time, a dermatitis of the left ear indicating a septicemia was beginning to show. The owner took the dog home against my advice.

The patient was returned on August 25th with a purulent discharge from the fistula. The eczema had become more extensive. The owner was advised to leave the dog in the hospital and that a laparotomy might be necessary. The ear was shaved and the eczema treated with 5% sulfathiazole ointment.

August 27th, the bitch was anesthetized with nembutal and a probe was introduced into the fistulous tract which extended under the lumbodorsal fascia to the lumbar region of the psoas muscle. The abscess was curetted and a seton smeared with sulfanilamide and cod-liver oil was threaded through the fistulous tract.

August 28th, the wound was redressed and 15,000 units of penicillin was administered intramuscularly every four hours. The temperature at this time was 103.2° F. The following day the dog's temperature had dropped to 102° F. and the wound was redressed with boric acid and iodoform. The penicillin therapy of the previous day was continued.

August 30th, the temperature was 106.2° F. The medicinal treatment consisted of the following:

a. Sulfathiazole 15 grains every four hours, *per os*.

b. Iodoform and boric acid applied locally to the wound.

c. Fifteen thousand units of penicillin every four hours intraperitoneally.

d. Sulfathiazole ointment was applied to the eczema of the ear. The following day the temperature was 106.5° F. and the treatment

Spikes and spike clusters of little barley lodged in the psoas major of a dog

of the preceding day was repeated and in addition hot packs, wet in a saturated solution of magnesium sulfate, were applied over the curetted area.

September first, the temperature was 105° F. The medicinal treatment of August 30th was repeated. A cold low enema was given to the patient. An intravenous injection consisting of 150cc of 5% dextrose solution, 20cc of canine bacterial antiserum and 25,000 units of penicillin was administered.

September 2nd, the temperature was 106° F. and a cold low enema and cold bath was given the dog. Medicinal treatment on this day consisted of:

a. Fifteen thousand units of penicillin every four hours intramuscularly.

b. Sodium salicylate, 10 grains *per os*, every six hours.

c. Ten cubic centimeters of canine bacterial antiserum, subcutaneously.

d. Intraperitoneally 150cc of 5% dextrose solution.

The following day the dog's temperature remained at 106.5° F. Medicinal treatment consisted of:

a. Sodium salicylate, 15 grains *per os*, every four hours.

b. Two B and iron tablets *per os* daily.

c. Intraperitoneally, 200cc of 5% dextrose solution.

The dog died on the morning of the fourth of September. Autopsy revealed four spikelets and two spike clusters of *Hordeum pusillum* (little barley) under the fifth lumbar vertebrae in the psoas major muscle. An abscess was located around the adrenal gland and was discharging into peritoneum, causing a generalized peritonitis. The kidney and spleen were engorged. No other lesions were found.

Reports of injury to cheeks, tongue and gums of cattle and sheep from spikelets of Hordeum (squirrel-tail grass) are common. The writer has not seen a previous account of injury in a dog from this grass. Since the awns on the spikelets are sharp and very hard their penetration in this case can perhaps be explained. How the two "heads" attained a sublumbar location is speculative so far as this writer is concerned.

W. THEOBALD

Raub, N. D.

Milk in the Treatment of Keratitis

We were interested in page 360 of the October, 1945, issue—"keratoconjunctivitis." This is frequently serious in southern Michigan cattle, where it is usually unilateral, causing lowered production, loss of weight, and occasionally, destroying the eye.

Ointments, mixed bacterins and fat-free sterile milk had served us fairly well, with the milk probably the most effective agent. For some five years now we have relied solely upon common evaporated milk from the grocery—any brand. Perhaps the fat content with the vitamin A and related materials is useful, for results have improved about 100%.

This keratitis was particularly severe in a small herd, where some eyes had been lost the preceding year. Recurrence of the disease the following year occasioned our contact with them and injection of 40cc of evaporated milk, as it came from the can; treating all the animals in the herd, infected or not. Results were perfect, except for the inevitable small corneal scars.

It would be appreciately hugely if someone could advise upon the use of evaporated milk for other conditions where a foreign protein is helpful. We have used it in other conditions with seemingly good results, but without, so far, finding anything responding so promptly as does "pinkeye."

Of course, some herds have a mild form of keratitis, and recover spontaneously. However, it seems that by the use of evaporated milk as a foreign protein stimulant we avoid new cases and bring about rather abrupt recoveries with no loss of eyesight, at cost of only one call; to the great satisfaction of the owner. This sort of thing, continuing as it has for five years, adds to the practitioner's peace of mind and fattens his purse.

J. H. WINTER

Brooklyn, Mich.

Bilateral Fracture of the Premaxilla in a Dog

October 28, 1945, a five-month-old, male, smooth haired, fox terrier pup was presented for treatment.

History.—A few hours earlier the owner had noticed the dog bleeding from the nostrils and he was unable to stop the hemorrhage. There was no history of injury.

Symptoms.—The dog was bleeding from both nostrils and was very sensitive to touch around the nose. The upper canine teeth were loose and were pushed into the sockets and appeared very short. A fluoroscopic examination showed a bilateral fracture of the premaxilla over the alveoli of the superior canine teeth at the anterior extremity of the nasal bones. The upper canine teeth had protruded through the alveoli into the nasal passages injuring the turbinates.

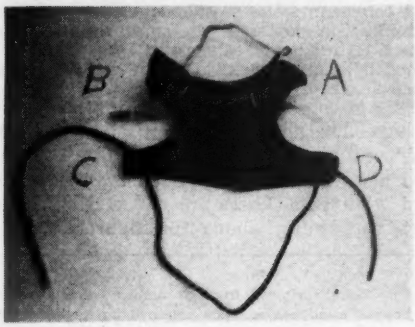
Treatment.—The dog was anesthetized with nembutal and the superior canine teeth were extracted. Penicillin was applied locally in the alveoli. Cold compresses were applied to the nose until the hemorrhage was stopped.

October 29: There was some swelling of nasal region at point of fracture and the dog was having some difficulty in breathing through the nostrils. Cold packs were applied for about one hour to reduce the swelling. Due to the soreness the animal would not eat, so it was necessary to feed it meat broth by stomach tube.

October 30: Cold packs applied to nose. The animal was fed by stomach tube.

October 31: Cold packs applied again. The animal fed broth by stomach tube.

November 1: The swelling had disappeared, and the breathing was apparently normal. A leather muzzle was constructed to immobilize the mouth so that healing might occur. A piece of soft leather about six inches wide and long enough to go around the lower jaws



and lap an inch or more over the fracture was selected. A U-shaped piece was cut out of each end to avoid covering the eyes and ears. The muzzle was put around the lower jaw and the flaps at the anterior end laced on the dorsal surface so that it fit snugly around the fractured bones. The flaps at posterior end of muzzle were brought up under throat and tied over the neck, just behind the ears; this prevented the muzzle from slipping forward and becoming loose. (See illustration.)

The dog was kept in the hospital seven more days. Each day the muzzle was loosened just enough to pass stomach tube for feeding and watering.

Result.—The muzzle was removed November 8th and the dog was sent home. The owner was instructed to keep the animal on a liquid diet for 10 days and then to return it for a check up.

On examination, ten days later, the dog appeared normal.

JAMES H. BURR

Weldon, N. C.

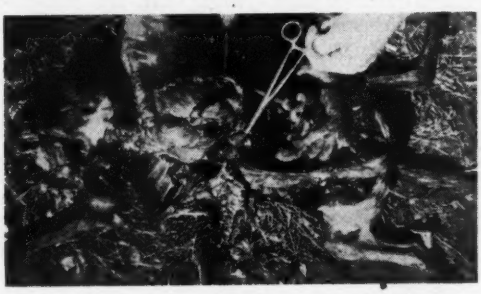
Diaphragmatic Hernia

October 7, 1945, a mongrel boxer five months of age, was presented for treatment. The history obtained was as follows: This dog had not eaten well for the past three or four days. Breathing was very difficult and had been since shortly after birth. The dog had not done well at any time. He had been confined to the yard and there was no history of any accident having occurred.

Symptoms.—The animal was very thin and small for its age. There was severe dypsnea, more pronounced on expiration. Abdominal breathing was pronounced. The pulse was rapid and weak; the temperature 100.7°F. The thoracic cavity, viewed with a fluoroscope, appeared to be filled with fluid to about an inch below the ventral border of the thoracic vertebrae. The level of the liquid appeared to wave when the dog was tilted back and forth. Also an irregular object about an inch in diameter appeared to be lodged against the diaphragm. It was suspected that this object had perforated the esophagus and water had flowed into the mediastinum. Upon auscultation a distinct, gurgling sound could be heard. The dog was given 10cc canine distemper antiserum and held for observation.

The following day the animal appeared much better. The temperature was 101.6° F., the pulse 132 and the respiration rate was 40.

October 11, the thoracic cavity was again examined with the fluoroscope and at this time nothing significant could be seen. The



Carcass of a dog with abdominal viscera in the thoracic cavity

temperature was still normal, pulse 120, and respirations 40.

The dog continued to improve for the next few days without treatment. The temperature remained normal, pulse rate around 120, and respirations around 40.

October 25, the dog died unexpectedly. Postmortem examination showed a severe, centrally located diaphragmatic hernia. The edges of the rent were rounded and completely healed. The stomach almost completely filled the thoracic cavity and was ballooned with gas. The entire spleen, the omentum and two lobes of the liver were also in the thoracic cavity. The entire liver showed extensive passive congestion. The two lobes of the liver in the thoracic cavity were very much misshapen. Both lungs were collapsed from the pressure exerted by these organs.

There is some evidence that this may have been a congenital diaphragmatic hernia. The history also was in accord with that possibility.

CLARENCE K. FELLMAN

Chanute, Kans.

Book Reviews

Thorobred Racing and Breeding.—The Story of the Sport and Background of the Horse Industry. Edited by *Tom Underwood*, Editor of the *Lexington* (Ky.) *Herald* and secretary of the State Racing Commissioners. Illustrated, 245 pages. Published by Coward-McCann, Inc., New York. Price $5.00.

This work, prepared under the auspices of the Thorobred Racing Associations of the United States, Inc., was written by 16 prominent sports editors and writers and officials of racing associations and racing commissions. It has received extravagant praise from the turf publications.

The subjects discussed are: The role of racing, racing as a sport, racing as a business, the breeding background, the horse farms, the yearling sales, training the horse, running the race, handicapping, races that are remembered, the specialists (trainers, jockeys, veterinarians, blacksmiths, etc.), American racing tracks and the tra (very brief history of racing in the U. S.), the official family, the jockey club, state racing commissions, the pari-mutuals, racing publications, American turf literature, art and the thorobreds and an appendix in considerable degree statistical, containing miscellaneous information about racing and racehorses.

A Testbook of Biochemistry.—By *Philip H. Mitchell*, Ph.D., Professor of Biology, Brown University. Illustrated, 640 pages. Published by McGraw-Hill Book Company, Inc., New York and London. 1946. Price $5.00.

This work is intended for a beginner's course in biochemistry. A knowledge of general chemistry including organic chemistry and of elementary physical chemistry being assumed, the emphasis in this text is upon such subjects as the constitution of enzymes, the intermediary reactions of anabolism and catabolism and the vital significance of hormones and vitamins.

The first four chapters deal with carbohydrates, photosynthesis fats and related substances, and proteins and amino acids which are designed to give the student a working knowledge of the chief materials of living matter. The remaining chapters, 17 in number, deal with the chemistry of life itself—vitamins, enzymes, hormones, blood and lymph, digestion, absorption and detoxication, acid-base regulation, carbohydrates, lipids and protein metabolism, animal tissues; the chemistry of foods, urine and chemotherapy.

The discussions bear heavily upon nutrition, include a great deal of material of medical significance and are by no means wanting in matters of pathological importance. It can be recommended unreservedly for either study or review of the subject of biochemistry.

Doctor Please Tell Me About My Dog and Cat.—By *E. A. Schmoker*, M.Sc., D.V.M. A series of 15 schematic illustrations with brief text concerning the most frequently asked questions by the clients of the small animal practitioner. Spiral bound with art paper covers. Published by the author, Rt. 2, Bothell, Wash. 1946. Price $5.00.

This is something unique in veterinary literature. The author, a practitioner, has taken the questions most often asked him by clients and answered them with schematic drawings and brief texts. There are 15, 7x12-inch, drawings containing about 150 figures. Opposite each page of drawings is a page of type with terse paragraph explanations numbered to correspond with the figures in the drawing. The reproduction (on the next page) of the first page of drawings (reduced) illustrates the way answers are given. The book is intended for the veterinarian's waiting room table. It will prove both entertaining and informative for clients.

Any book reviewed in these pages, or any other book if available, may be obtained by remitting the published price to VETERINARY MEDICINE, 7632 S. Crandon Ave., Chicago 49. Bulletins and Circulars should be requested direct from the address given in the notice. Generally they are supplied free unless a price is stated.

Useful Bulletins, Circulars, Etc.

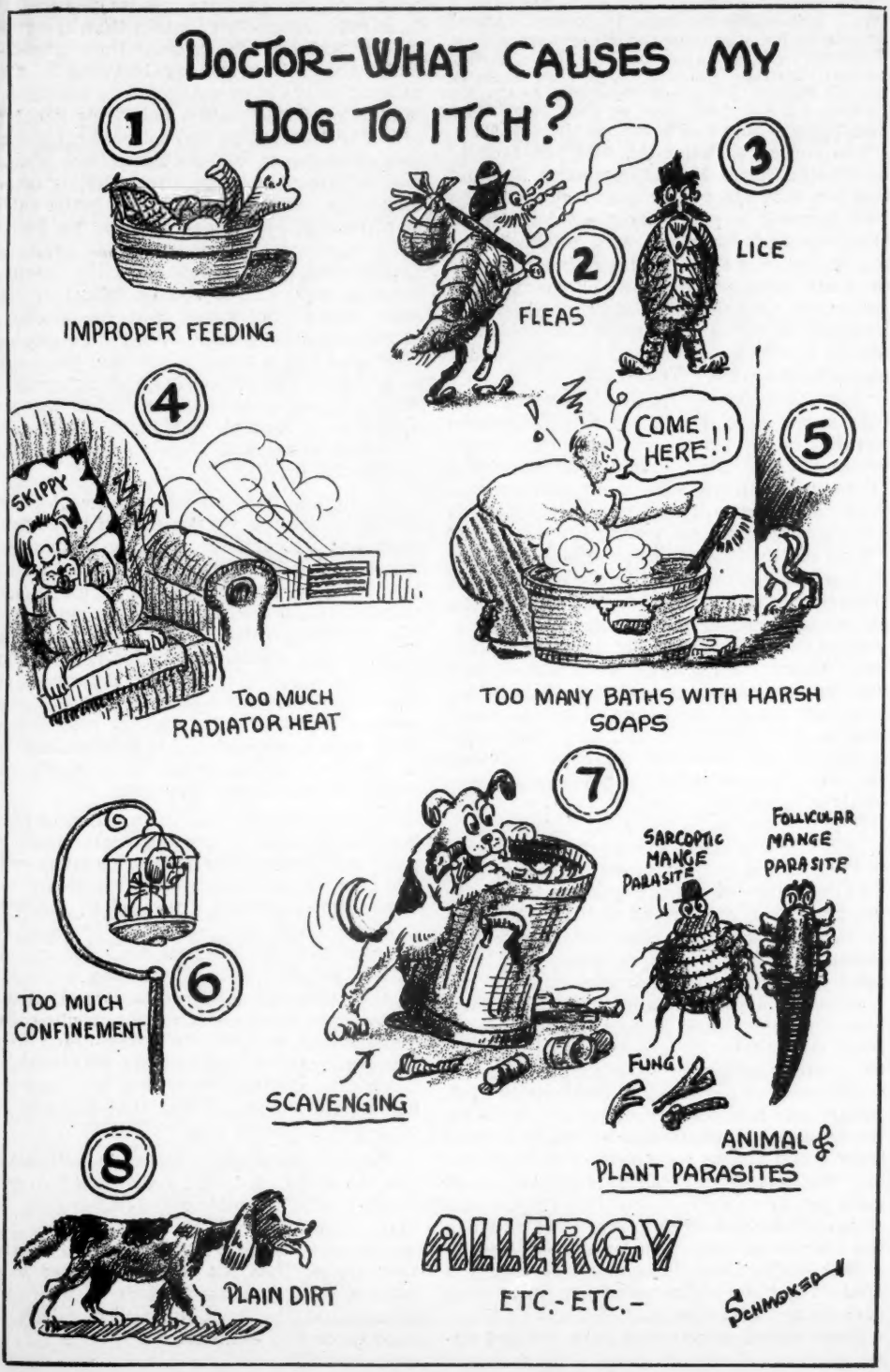
Dried Milks.—BDIM—Inf.-25 (June, 1945) U. S. Dept. Agr., Washington 25, D. C.

Sheep Diseases.—A discussion of disease in general and a description of specific diseases as to economic importance, cause, symptoms, diagnosis and control. Ext. Cir. 130 California Agr. Col. Berkeley.

Infection by Group G-Streptococci in Animals.—31-page reprint (in English) from *Skandinavisk Veterinartidskrift*. Prof. Sven J. Olsen, Royal Veterinary and Agricultural College, Copenhagen, Denmark.

Collected Papers.—Collected papers for 1944 from the Royal Veterinary Institute Stockholm, Sweden. One paper—Hereditary forms of Sterility in Cattle—(155 pages) in English. The others contain English summaries.

Medical Journal.—Vol. 13 (1944) of *Medical Journal of the Academy of Sciences of the Ukranian* SSR. This volume contains many papers, in both Russian and English, dealing with the use of antireticular cytoxic serum in the treatment of various diseases and injuries. Perhaps the one of greatest present interest is "Antireticular Cytotoxic Serum as a means of Pathogenetic Therapy" by A. A. Bogomoletz, Kiev, Russia.


DOCTOR-WHAT CAUSES MY DOG TO ITCH?
1
IMPROPER FEEDING
2
FLEAS
3
LICE
4
SKIPPY
TOO MUCH RADIATOR HEAT
5
COME HERE!!
TOO MANY BATHS WITH HARSH SOAPS
6
TOO MUCH CONFINEMENT
7
SCAVENGING
SARCOPTIC MANGE PARASITE
FOLLICULAR MANGE PARASITE
FUNGI
ANIMAL & PLANT PARASITES
8
PLAIN DIRT
ALLERGY
ETC.-ETC.-
SCHMOKER

Animal Breeding.—By *A. L. Hagedoorn*, Ph.D., Privaatdocent, State University, Leiden; Secretary, Nederlansche Genetiche Vereeniging. Foreword by John Hammond, M.A., D.Sc., F.R.S., Animal Nutrition Institute, Cambridge, England. Second Edition, 304 pages. Published by Crosley Lockwood & Son, Ltd., London. 1946. Price (15s) with postage, duty and insurance about $4.00.

The author, a Hollander, who has lived in the United States, France, Germany, England and the East Indies and has traveled widely, was formerly a plant geneticist but for 20 years has been concerned with animal breeding. His experience with many different species in many different climates and many lands convinces him that the science of animal breeding is 30 years behind that of plant breeding although the problems are fundamentally the same.

"For different reasons plant breeders have been much more ready than animal breeders to profit by the teachings of our new science-genetics." . . . "Even without any knowledge of genetics man was able to domesticate animals and improve them. Such progress, however, is very slow and uncertain."

This work is written for breeders. "I am not so optimistic as to believe in the possibility of convincing the conservative, older authorities on animal breeding (government men, teachers and herdbook officials) of the error of their ways, where I think they are fundamentally wrong . . . they take the attitude that the old ways will last out their time. If we can reach the younger generation and stop them from taking the old wisdom for granted, if we can get them to think for themselves, we will certainly get results."

It is perhaps not a too great simplification of the author's discussion to state that livestock, dog and poultry shows are responsible for the failure of animal breeders to employ the knowledge of genetics available to them as the plant breeders have done. By setting almost irrelevant standards, shows have centered attention on the individual animal. The approach of a selected animal to or divergence from a predetermined physical standard bears little relation to its genotype and only its genes are inherited by its offspring. It is the adaptability of the group to its niche in agriculture that is important genetically. By selection superior animals can be found in any large group almost regardless of their breeding. The progeny of a show champion is not more apt to be a champion than the progeny of other members of its group, some of which the breeder probably would not want seen on a dark night. Show champions are largely a product of their environment and such products are not heritable.

Breed record associations have fostered appraisal of the individual on its physical attainments and pedigree rather than the group on its performance, because their members make their living selling individuals. Even progeny tests are so conducted as to supply a minimum of information about the genotype of the animal, e.g., proved bulls are rated upon the performance of selected heifers from a selected group of cows, when what is necessary is the performance of all his heifer calves or at least of an average group of his heifers on a representative group of cows. Trapnesting selected hens to determine the breeding value of their sire is equally fallacious. The point being individuals can be evaluated genetically only by evaluating the group similarly bred and a progeny test is of value only as it reflects average results with a representative sample of animals in which the test animal is to be used. "We should never compare individuals with individuals, but always breeds with breeds."

The author finds no excuse, except short-sighted selfishness, on the part of breed association officials and members, for the common lethal factors and other aberrations in purebred animals since the method for eliminating these factors is well known, fairly simple and not overly expensive. Such aberrant offspring as colts with atresia ani, bulldog calves, runt and weakling pigs, lambs with deformed feet, chicks that die in the shell (from other than external causes) and ducklings with incomplete crania, occasion a heavy economic loss to livestock raisers which is avoidable and should be eliminated forthwith.

The proper function of the breeders of purebred animals is to take material comprising many individuals heterozygous for many genes and therefore exhibiting great variability, and follow methods which will result in purity for the most favorable combination of genes, i.e., produce individuals homozygous for the desirable genes, largely eliminating variability in the group, except as it is a result of environmental factors (different feeding and management, climate, etc.). The desideratum being animals most profitable to agriculture under the conditions prevailing, not some predetermined shape and size that will win applause in the show ring.

There are many conditions and qualifications but the foregoing is the main thesis. A great number of illustrations and interesting examples from the author's vast experience render the work at once fascinating and instructive; a work that can be recommended to all interested in breeding animals be they farm animals, poultry, dogs, fur bearers, laboratory animals or wild animals.

Establishing a resistant herd by calfhood vaccination is economically the most practical method of controlling Brucellosis

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(STRAIN 19)

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You'll Be Interested to Know That . . .

Ed Majerus, Belgium, Wis., marketed a Chester White barrow at the Milwaukee stockyards recently for $133.90, the highest price paid for a hog at the Milwaukee yards in 25 years. The animal weighed 1030 pounds and sold for 13 cents per pound.

■

Search for Old Dogs

The Gaines Dog Research Center, New York City, has launched a search for the oldest dog in America. When the dog is found, it and its owner or owners will be suitably honored during the forthcoming observance of National Dog Week, September 22 to 28.

Persons owning or knowing of extremely aged dogs are urged to send complete data and pictures immediately to Mr. Harry Miller, executive secretary, 250 Park Avenue, New York 17, N. Y.

Any documentary papers submitted will be returned after National Dog Week is over.

■

Doctor Greig Awarded C.B.E.

The King's Honors List issued on the occasion of his Majesty's birthday anniversary contains the name of J. Russel Greig, Ph.D., M.R.C.V.S., F.R.S.E., director of Moredun Institute of the Animal Diseases Research Institute of Scotland, who was awarded the C.B.E. (Commander in the Order of the British Empire) in recognition of his achievements in veterinary research.

Doctor Greig is best known in the United States for his work on parturient paresis and his development of the calcium gluconate treatment for that ailment and as Editor-in-Chief of the English translation of "Hutyra Marek and Manninger." He attended the 12th International Veterinary Congress in New York in 1934 and met many American veterinarians at that time who will be gratified to learn of the signal honor that has come to him.

■

New Research Institute

The new Sterling-Winthrop Research Institute will be housed in new research laboratories to be erected at Rensselaer, N. Y. Dr. Maurice L. Tainter, Rensselaer, N. Y., at present research director of Winthrop Chemical Company, Inc., has been named director of the Sterling-Winthrop Research Institute. Situated on a 70 acre site near the Winthrop plant and laboratories, the institute will employ 350 scientists and assistants. The structure will consist of three wings built in the general form of the letter U. In addition to offices, the administrative wing of the new structure will have lecture rooms and space for a complete technical library. The east wing will contain, in addition to biologic laboratory units, rooms for photography, x-ray and extreme temperature testing. The west wing will house pharmaceutical and chemical research laboratory units, together with special chemical development facilities and a pilot plant.—*J. Am. Med. Assn.*

Father and Son Activity

Dr. Hubert Shull, Texarkana, is president of the Texas Veterinary Medical Association. Dr. Hubert Shull, Jr., Texarkana, is president of the Arkansas Veterinary Medical Association.

■

Dr. W. C. Schofield, ISC '31, became associated with Purina Mills in St. Louis, as poultry pathologist after four years in the Veterinary Corps. Doctor Schofield had been on the staff of Louisiana State University before entering the service.

■

The excellent results in hay fever and hives following use of benodryl (beta dimethylaminoethyl benzhydryl ethel hydrochloride) are believed to be achieved as a result of its antihistamine action. It is thought that overproduction of histamine causes the symptoms of these allergic disorders. The drug is not a cure but relieves the disagreeable symptoms.

■

Dog Breeding Big Business in Ireland

Greyhound breeders in Eire are finding demand for racing stock so good that their canine exports for 10 months last year were valued at $2,444,000, mostly to England and the United States. This amount was twice the value of fat cattle exports and even so, the total figures on returns from dog sales are deceptive because they take no account of arrangements between dealers on both sides for price revision above the official export figures. One Dublin buyer puts the real value of Eire's dog exports last year at $8,000,000. British buyers will pay thousands of dollars for trained dogs and only slightly less for untrained greyhounds of good breeding. Dogs are flown to the United States and the demand is increasing.—*American Fur Breeder.*

■

Dr. A. J. Carlson Honored

Anton Julius Carlson, M.D., Ph.D., world famous physiologist, received the Distinguished Service Medal of the American Medical Association at the recent annual meeting of the Association in San Francisco.

Doctor Carlson was Professor of Physiology in the University of Chicago from 1909 to 1940, when he retired with the title of emeritus. He has been president of the American Physiological Society, the Society for Experimental Biology and Medicine, the American Biological Society and the American Society for the Advancement of Science. His literary contributions in the fields of physiology and nutrition have been vast. Doctor Carlson is a member of the A.M.A. Committee for the Protection of Medical Research and one of the most effective opponents of the anti-vivisectionists and president of the newly organized association, the National Society for Medical Research.